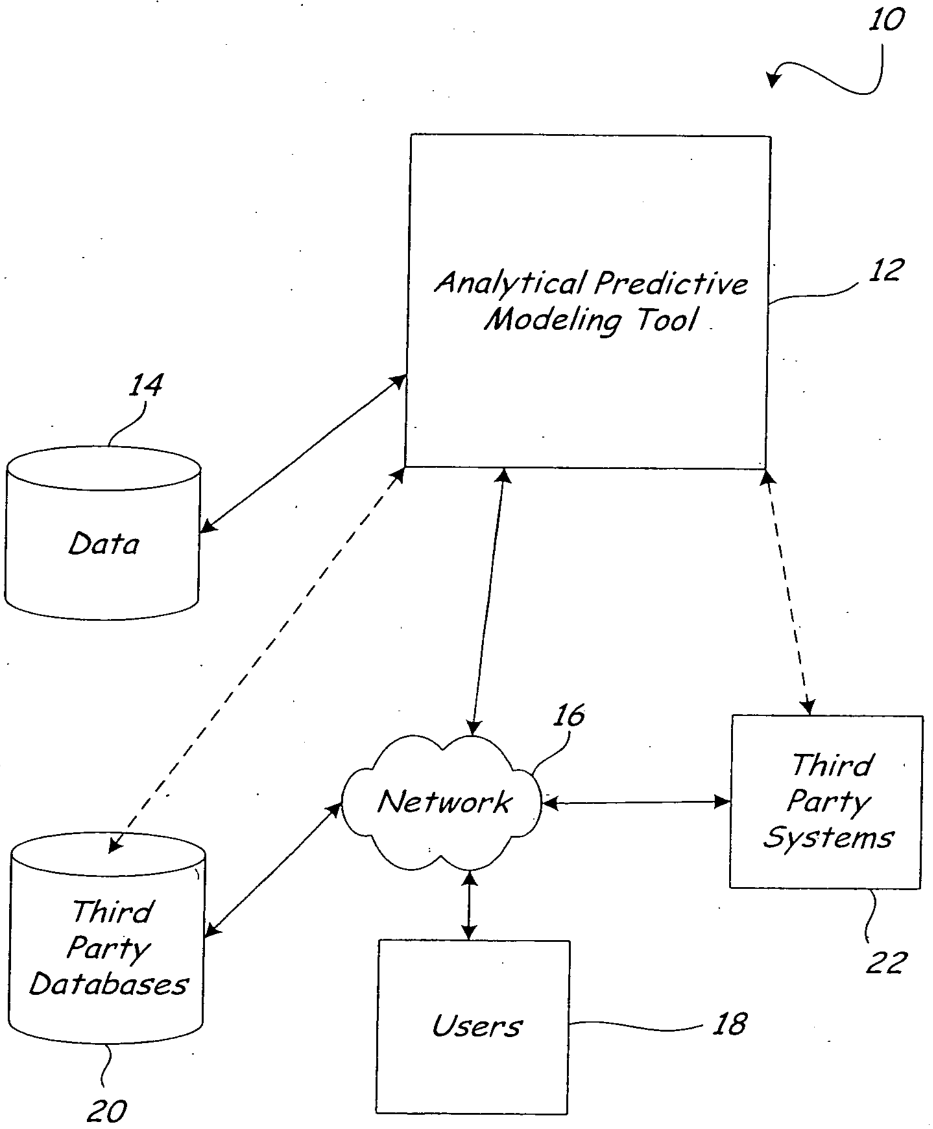

10
Analytical Predictive Modeling Tool
12
14
Data
16
Network
Third Party Systems
22
Third Party Databases
20
Users
18

FIG. 1

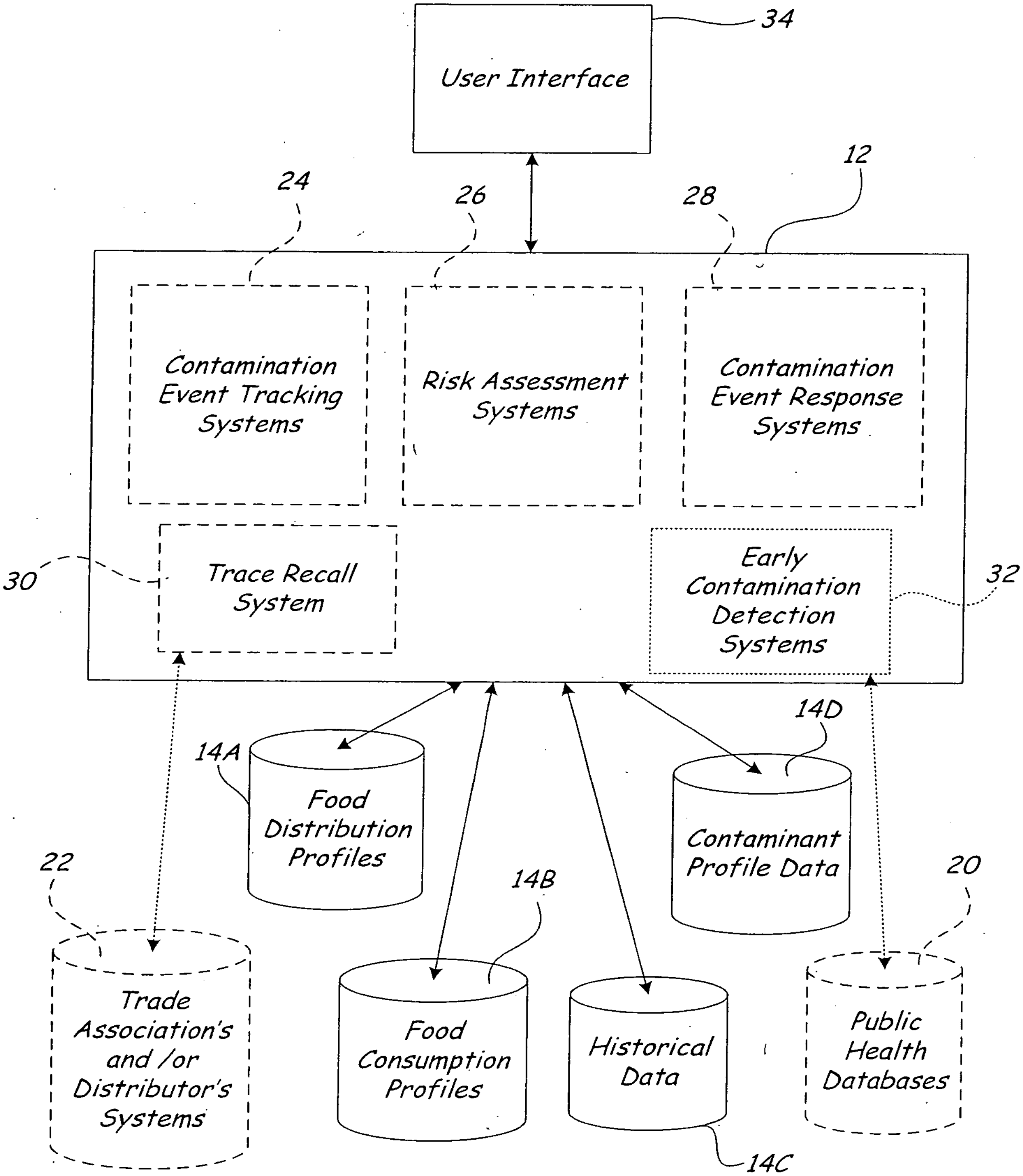
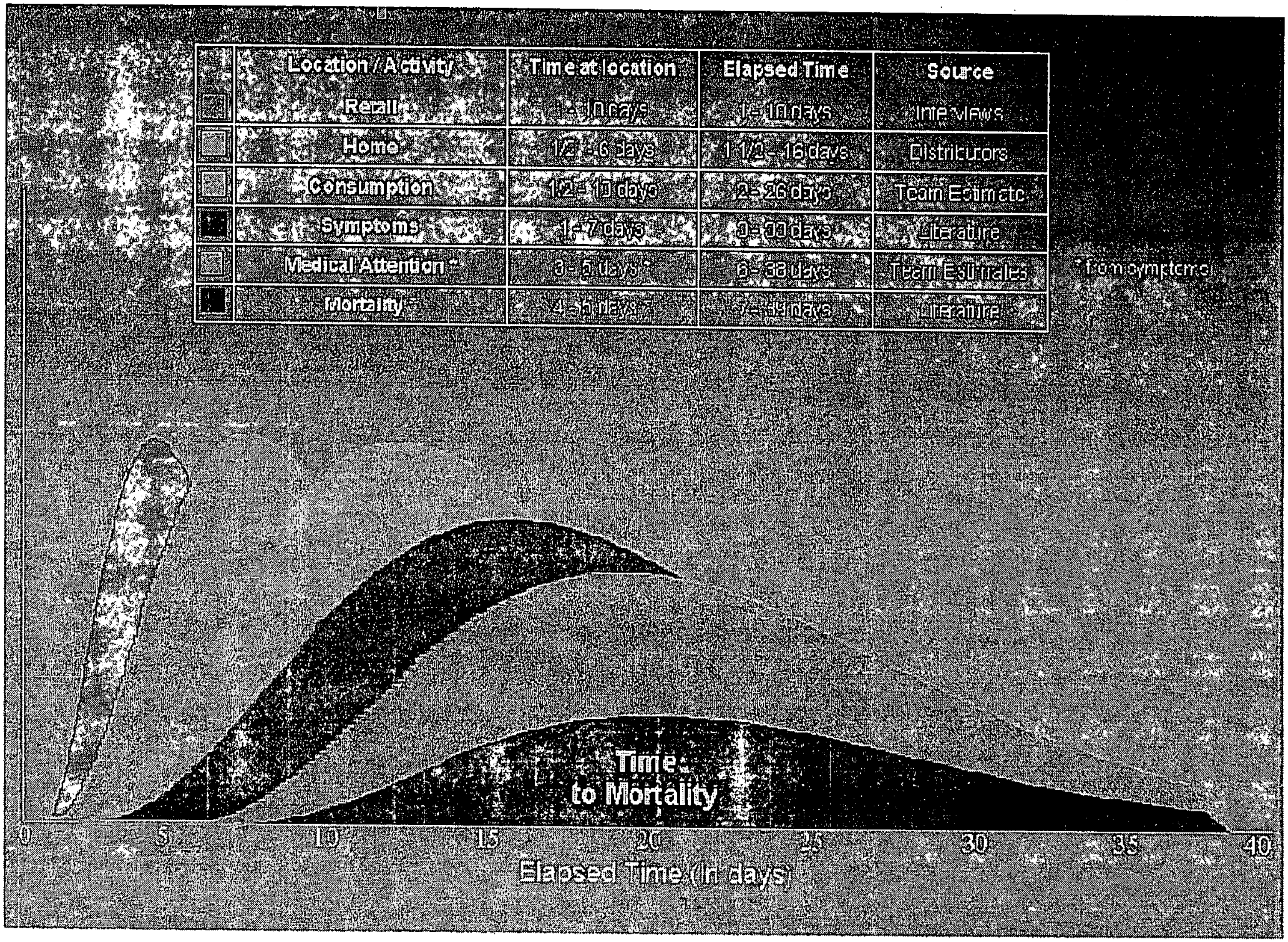

User Interface
34
12
24
26
28
Contamination Event Tracking Systems
Risk Assessment Systems
Contamination Event Response Systems
30
Trace Recall System
Early Contamination Detection Systems
32
14A
Food Distribution Profiles
14D
Contaminant Profile Data
22
Trade Association's and /or Distributor's Systems
14B
Food Consumption Profiles
Historical Data
14C
20
Public Health Databases

FIG. 2



	Location / Activity	Time at location	Elapsed Time	Source
▨	Retail	1 - 10 days	1 - 10 days	Interviews
▨	Home	1/2 - 6 days	1 1/2 - 16 days	Distributors
▨	Consumption	1/2 - 10 days	2 - 26 days	Team Estimate
■	Symptoms	1 - 7 days	3 - 33 days	Literature
▨	Medical Attention *	3 - 5 days *	6 - 38 days	Team Estimates
■	Mortality *	4 - 6 days *	7 - 39 days	Literature

* from symptoms

FIG. 3

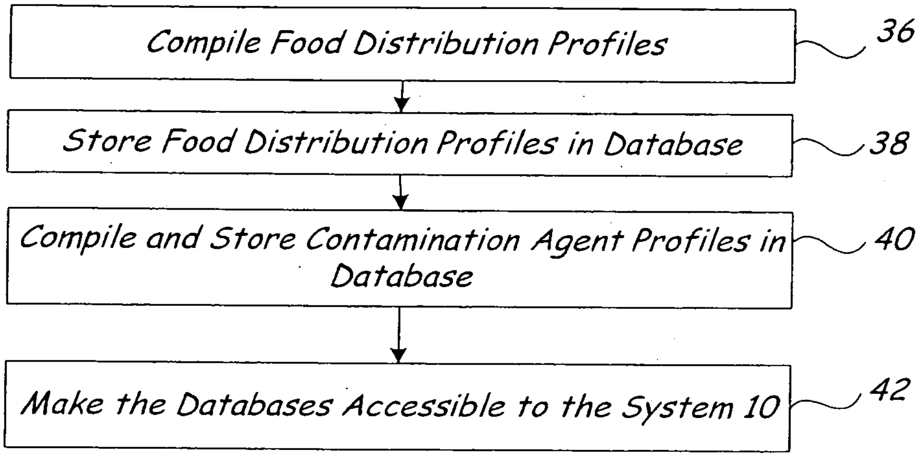

Compile Food Distribution Profiles
36
Store Food Distribution Profiles in Database
38
Compile and Store Contamination Agent Profiles in Database
40
Make the Databases Accessible to the System 10
42

FIG. 4

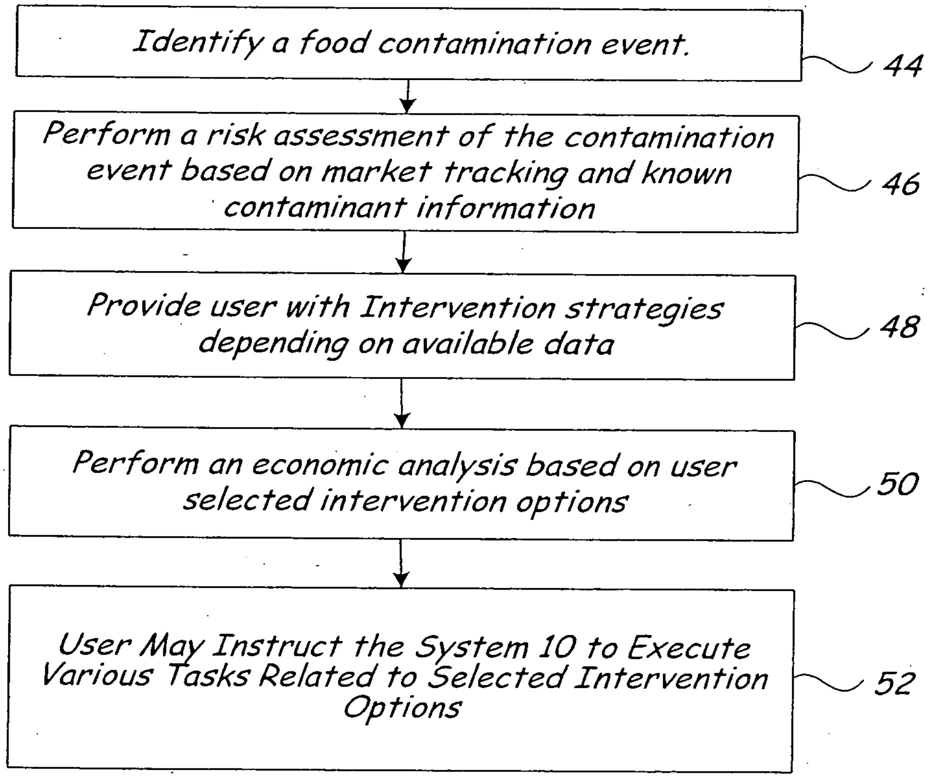

Identify a food contamination event.
44
Perform a risk assessment of the contamination event based on market tracking and known contaminant information
46
Provide user with Intervention strategies depending on available data
48
Perform an economic analysis based on user selected intervention options
50
User May Instruct the System 10 to Execute Various Tasks Related to Selected Intervention Options
52

FIG. 5

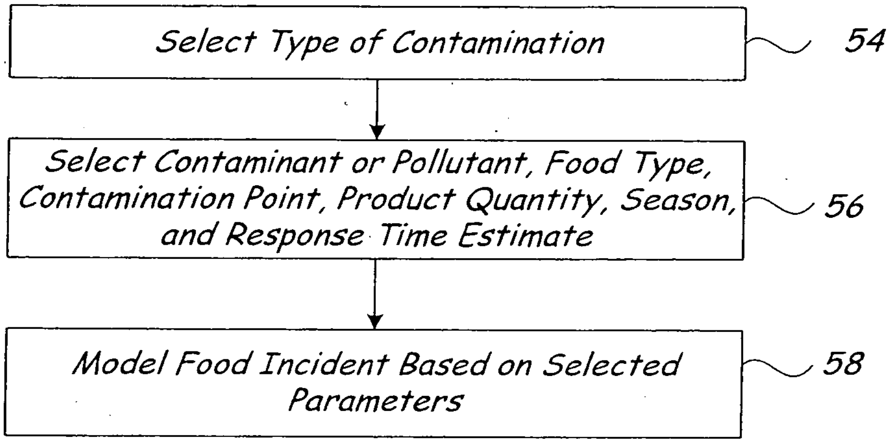

Select Type of Contamination
54
Select Contaminant or Pollutant, Food Type, Contamination Point, Product Quantity, Season, and Response Time Estimate
56
Model Food Incident Based on Selected Parameters
58

FIG. 6

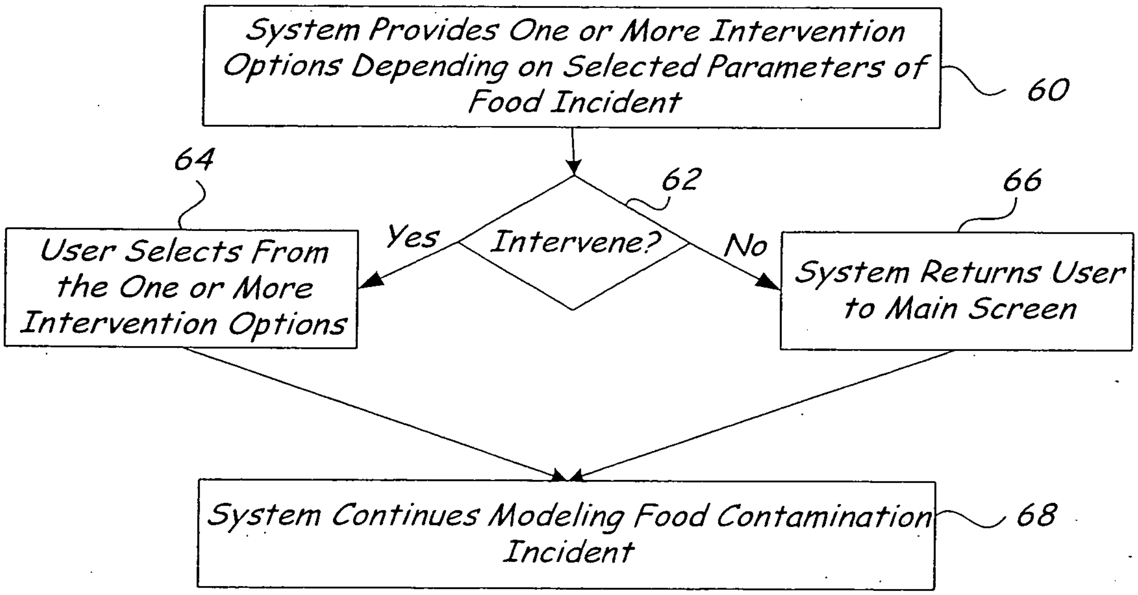
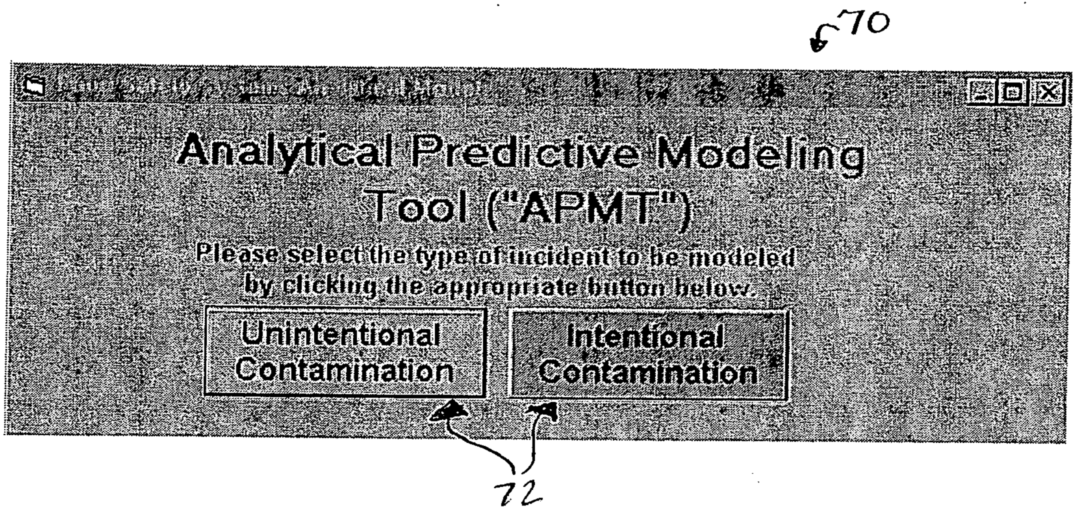

System Provides One or More Intervention Options Depending on Selected Parameters of Food Incident
60
64
62
66
Yes
Intervene?
No
User Selects From the One or More Intervention Options
System Returns User to Main Screen
System Continues Modeling Food Contamination Incident
68

FIG. 7

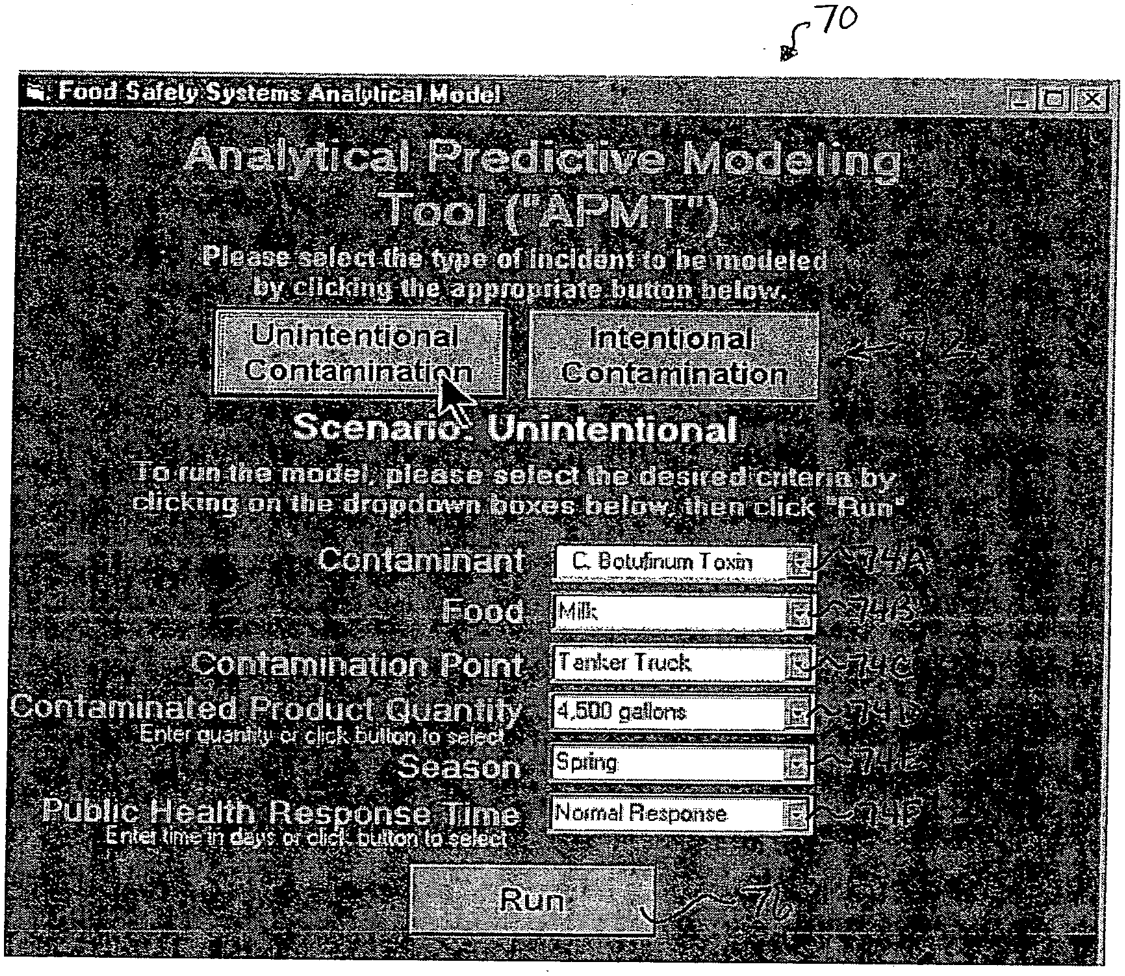


70
Unintentional Contamination
Intentional Contamination
72

Analytical Predictive Modeling Tool ("APMT")

Please select the type of incident to be modeled by clicking the appropriate button below.

FIG. 8



70
Food Safety Systems Analytical Model
Unintentional Contamination
Intentional Contamination
72
74A
74B
74C
74D
74E
74F
Run
76

Analytical Predictive Modeling Tool ("APMT")

Please select the type of incident to be modeled by clicking the appropriate button below.

Scenario: Unintentional

To run the model, please select the desired criteria by clicking on the dropdown boxes below, then click "Run"

Contaminant: C. Botulinum Toxin

Food: Milk

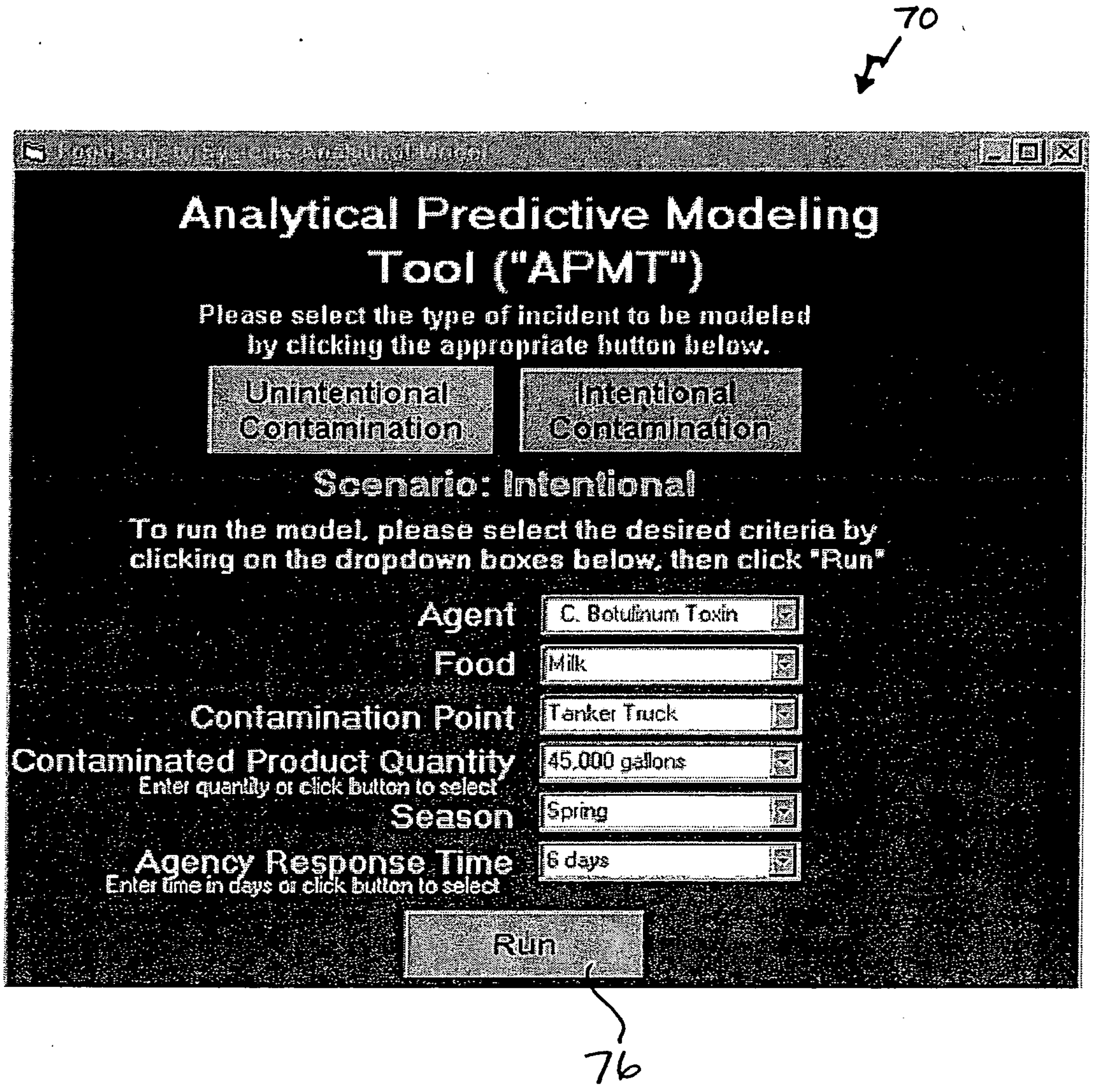
Contamination Point: Tanker Truck

Contaminated Product Quantity (Enter quantity or click button to select): 4,500 gallons

Season: Spring

Public Health Response Time (Enter time in days or click button to select): Normal Response

FIG. 9


70
Unintentional Contamination
Intentional Contamination
Run
76

Analytical Predictive Modeling Tool ("APMT")

Please select the type of incident to be modeled by clicking the appropriate button below.

Scenario: Intentional

To run the model, please select the desired criteria by clicking on the dropdown boxes below, then click "Run"

Agent: C. Botulinum Toxin

Food: Milk

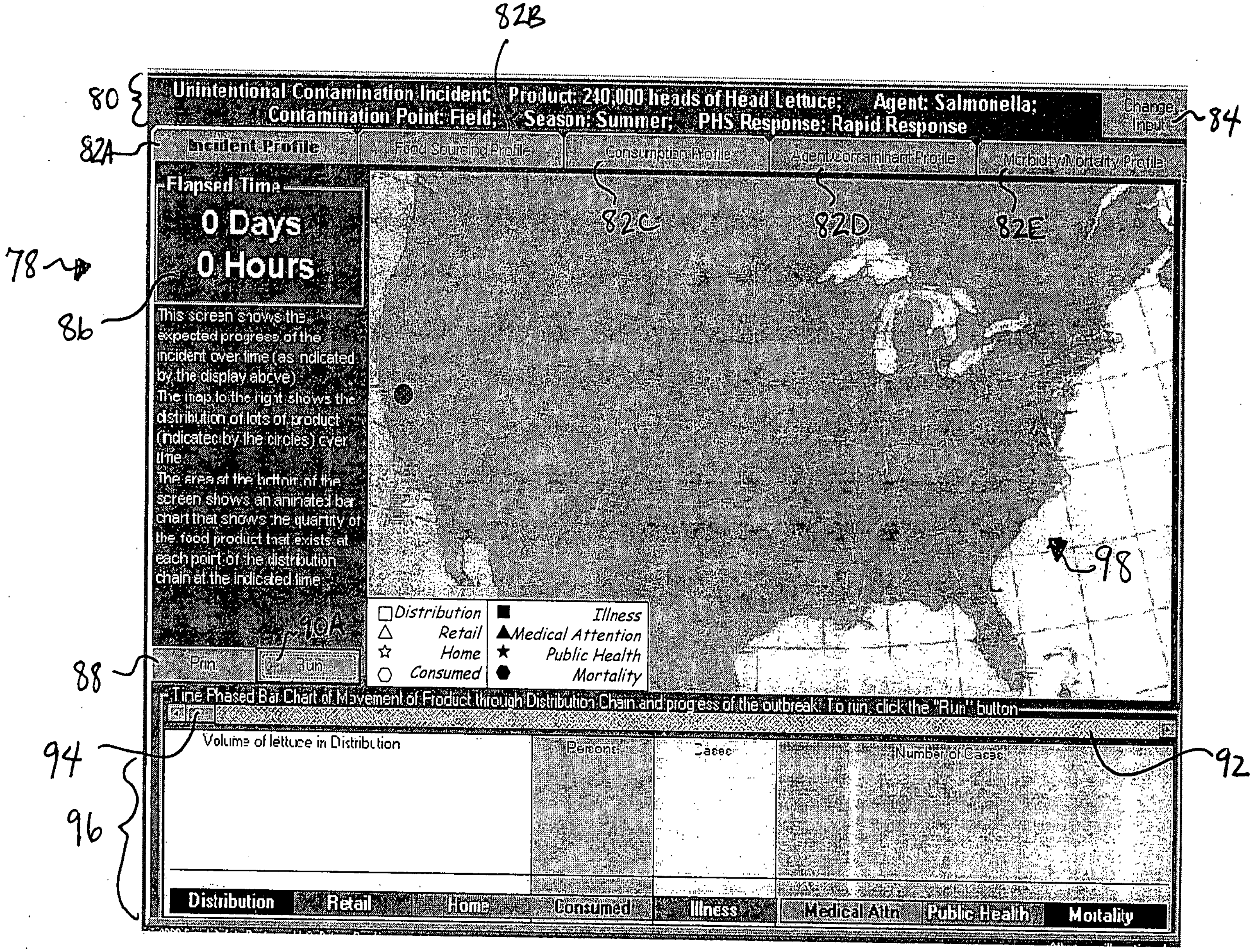
Contamination Point: Tanker Truck

Contaminated Product Quantity: 45,000 gallons
Enter quantity or click button to select

Season: Spring

Agency Response Time: 6 days
Enter time in days or click button to select

FIG. 10



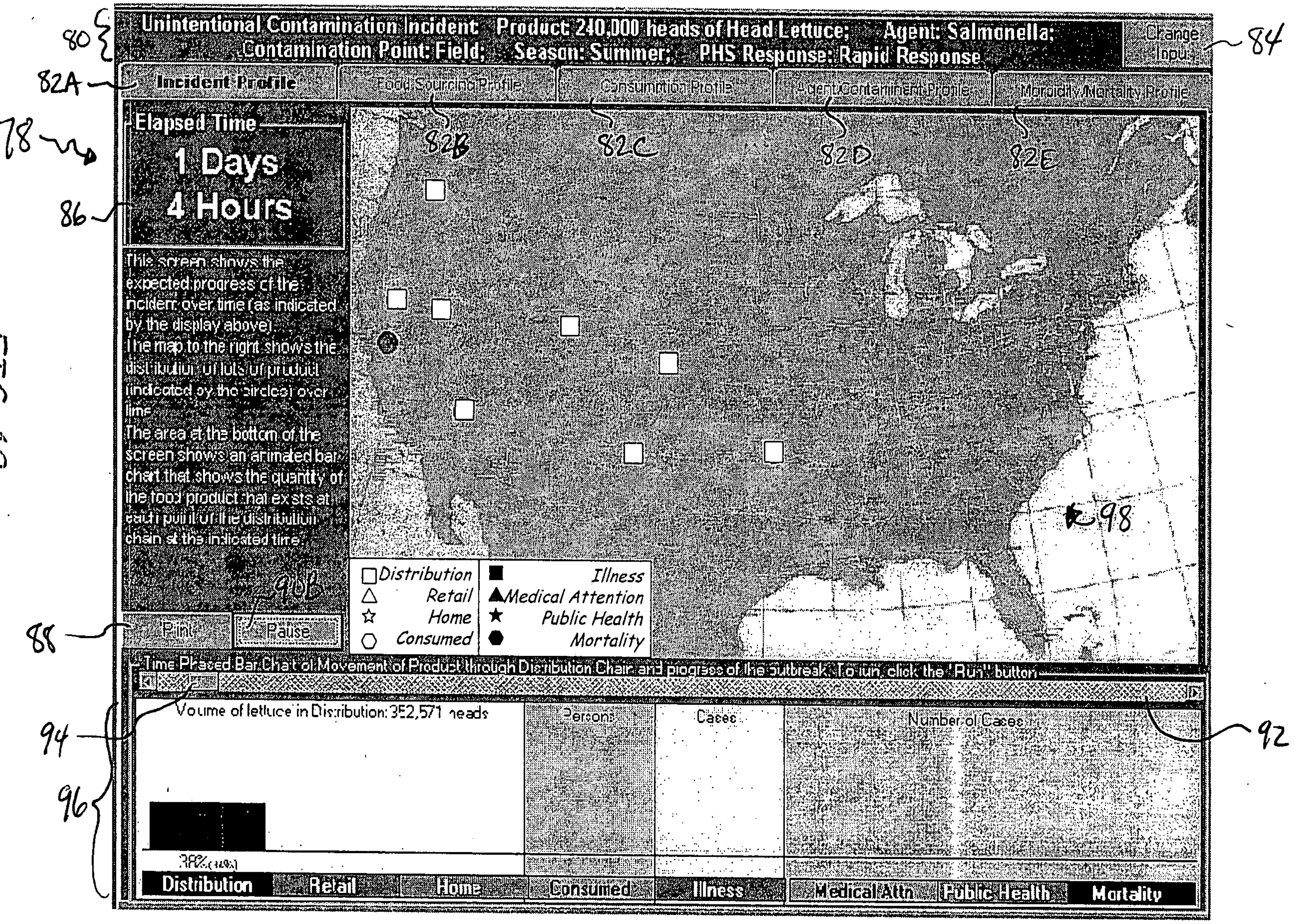
Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

This screen shows the expected progress of the incident over time (as indicated by the display above).
The map to the right shows the distribution of lots of product (indicated by the circles) over time.
The area at the bottom of the screen shows an animated bar chart that shows the quantity of the food product that exists at each point of the distribution chain at the indicated time.

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Flapsed Time
0 Days
0 Hours
Print
Run
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
Volume of lettuce in Distribution
Percent
Cases
Number of Cases
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Motality
80
82A
82B
82C
82D
82E
84
78
86
88
90A
92
94
96
98

FIG. 11



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time: 1 Days 4 Hours

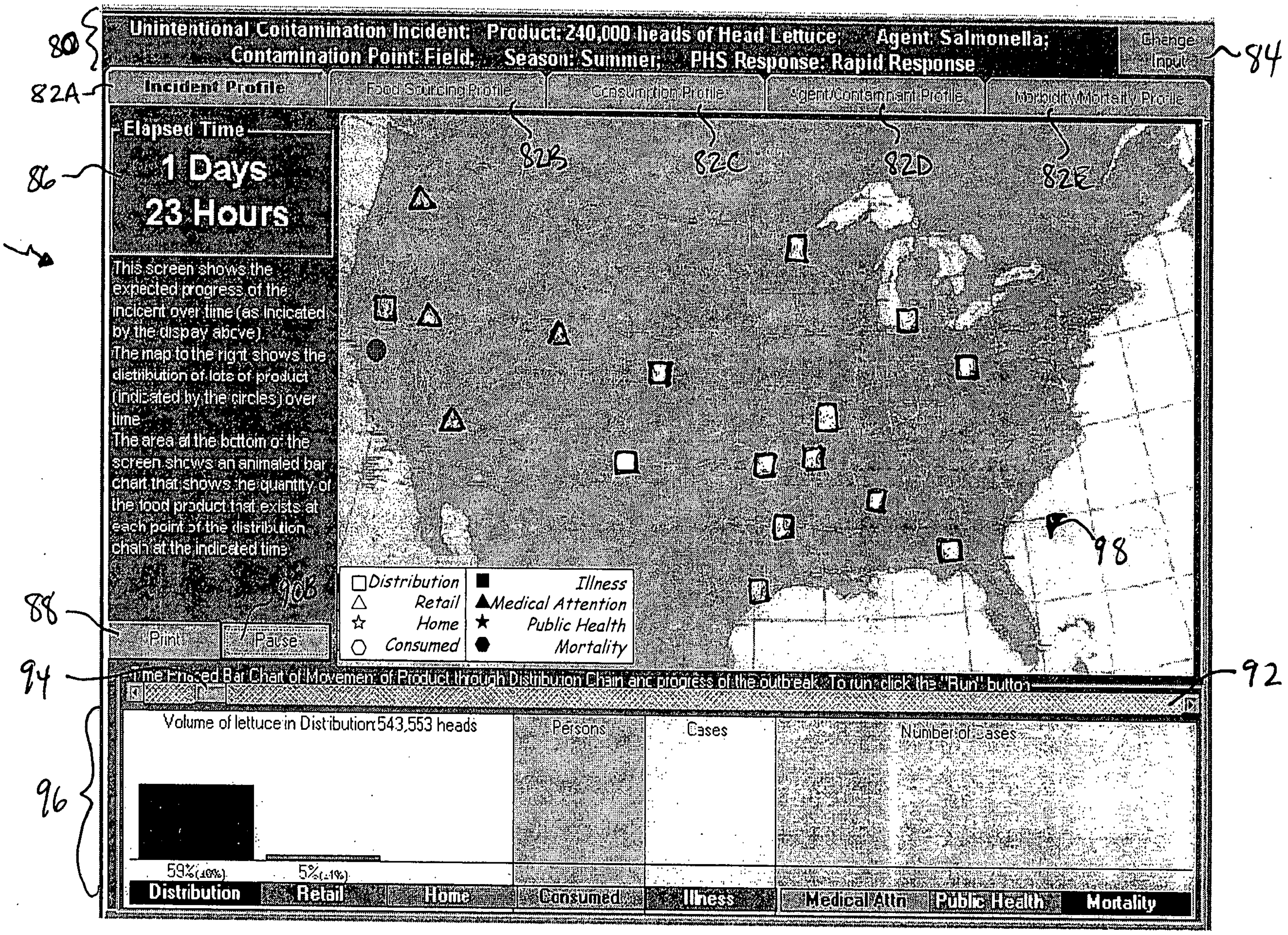
This screen shows the expected progress of the incident over time (as indicated by the display above).
The map to the right shows the distribution of lots of product (indicated by the circles) over time.
The area at the bottom of the screen shows an animated bar chart that shows the quantity of the food product that exists at each point of the distribution chain at the indicated time.

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 352,571 heads

80
84
Change Input
82A
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
82B
82C
82D
82E
78
86
90B
88
Print
Pause
98
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
94
96
92
38%
Persons
Cases
Number of Cases
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

FIG. 12


80
84
82A
82B
82C
82D
82E
86
78
88
90B
94
92
96
98
Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Pause
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
59% (±10%)
5% (±1%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time

1 Days
23 Hours

This screen shows the expected progress of the incident over time (as indicated by the display above).
The map to the right shows the distribution of lots of product (indicated by the circles) over time.
The area at the bottom of the screen shows an animated bar chart that shows the quantity of the food product that exists at each point of the distribution chain at the indicated time.

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

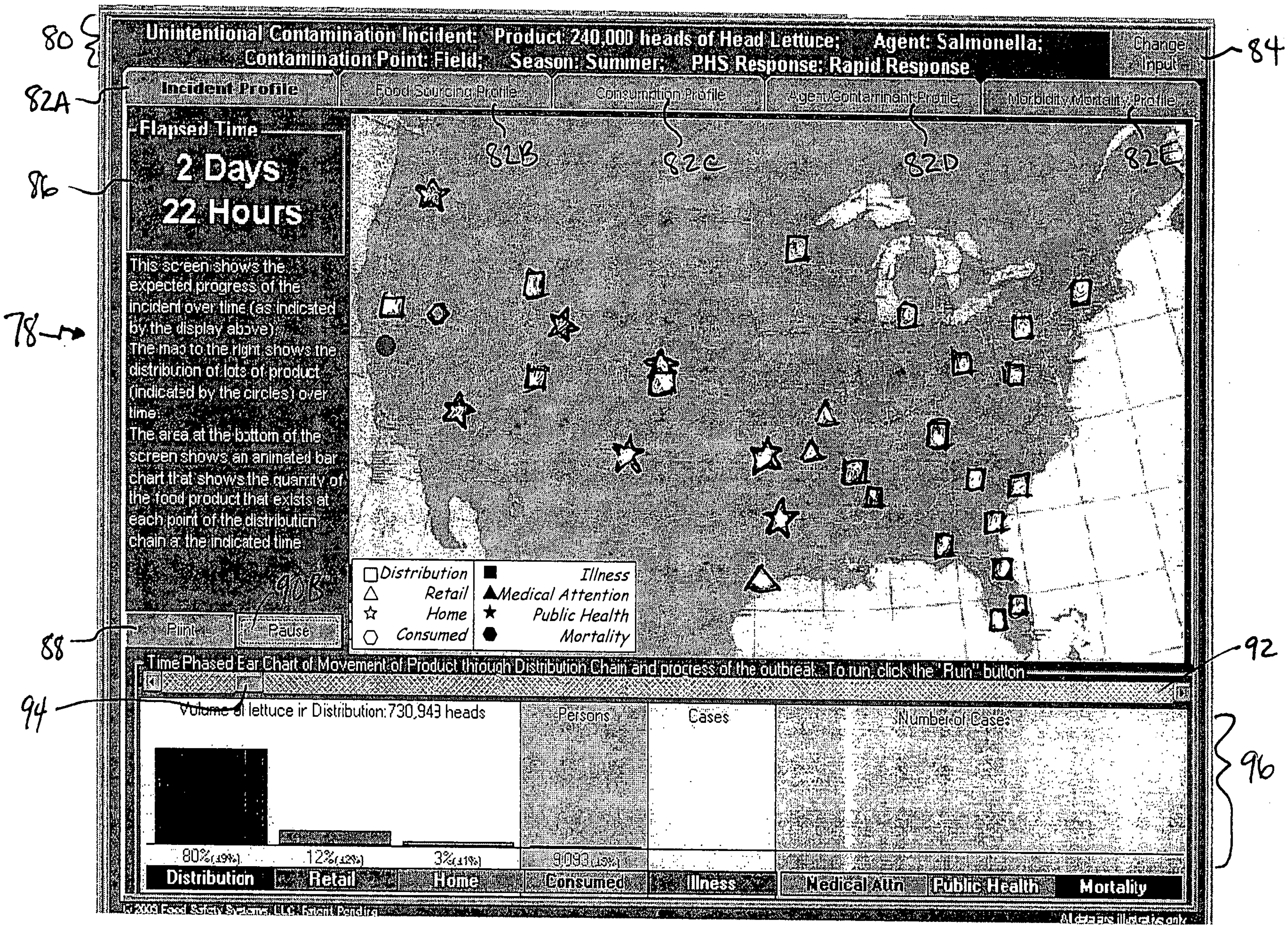
Volume of lettuce in Distribution 543,553 heads

Persons

Cases

Number of Cases

FIG. 13


80
82A
82B
82C
82D
82E
84
86
78
88
90B
92
94
96
Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Pause
☐ Distribution
△ Retail
☆ Home
⬡ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
Persons
Cases
Number of Cases
80%(±9%)
12%(±2%)
3%(±1%)
9,093 (±5%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
2 Days
22 Hours

This screen shows the expected progress of the incident over time (as indicated by the display above).
The map to the right shows the distribution of lots of product (indicated by the circles) over time.
The area at the bottom of the screen shows an animated bar chart that shows the quantity of the food product that exists at each point of the distribution chain at the indicated time.

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 730,943 heads

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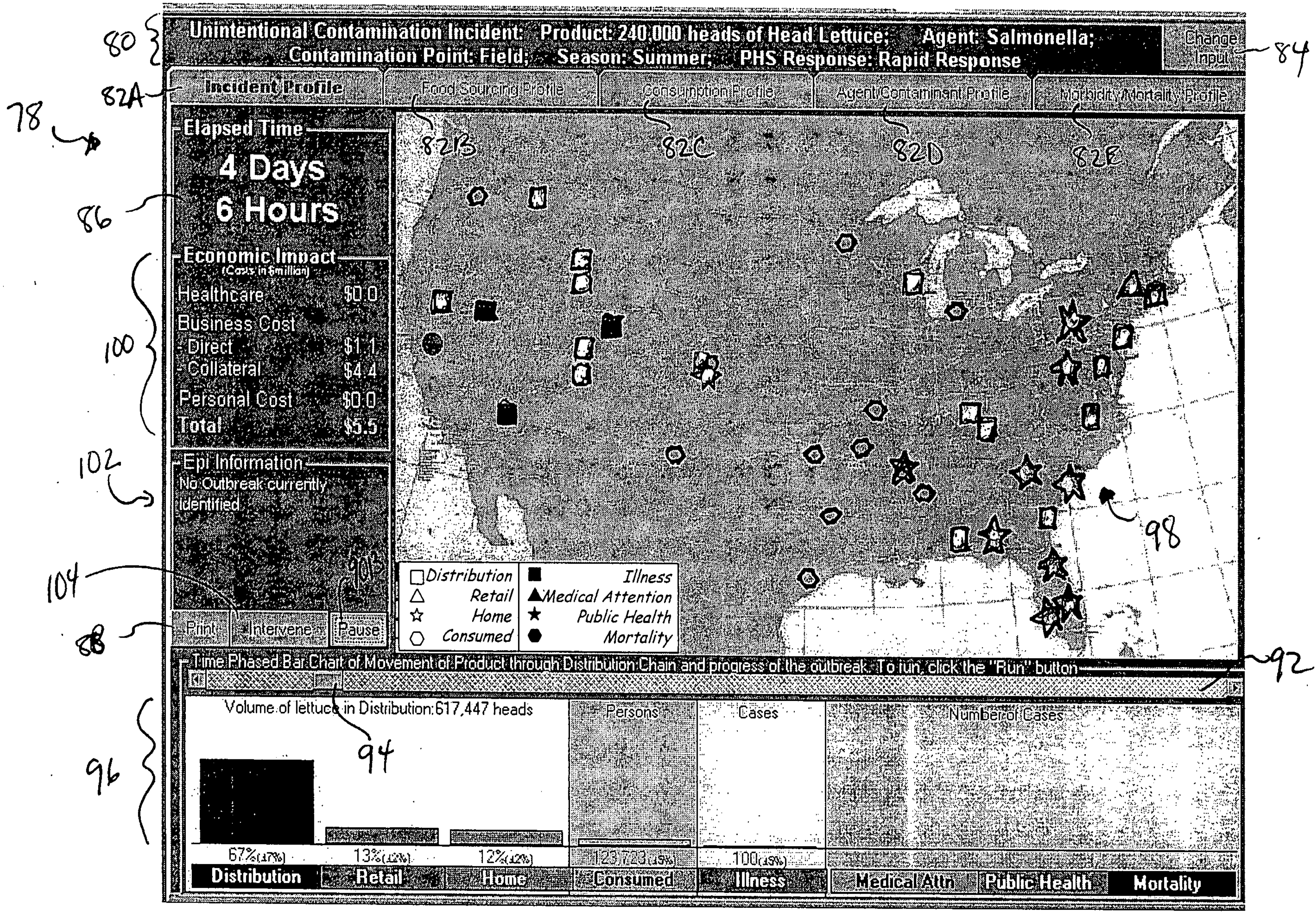
All data are illustrative only

FIG. 14



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
4 Days
6 Hours

Economic Impact (Costs in $million)

Healthcare	$0.0
Business Cost	
- Direct	$1.1
- Collateral	$4.4
Personal Cost	$0.0
Total	$5.5

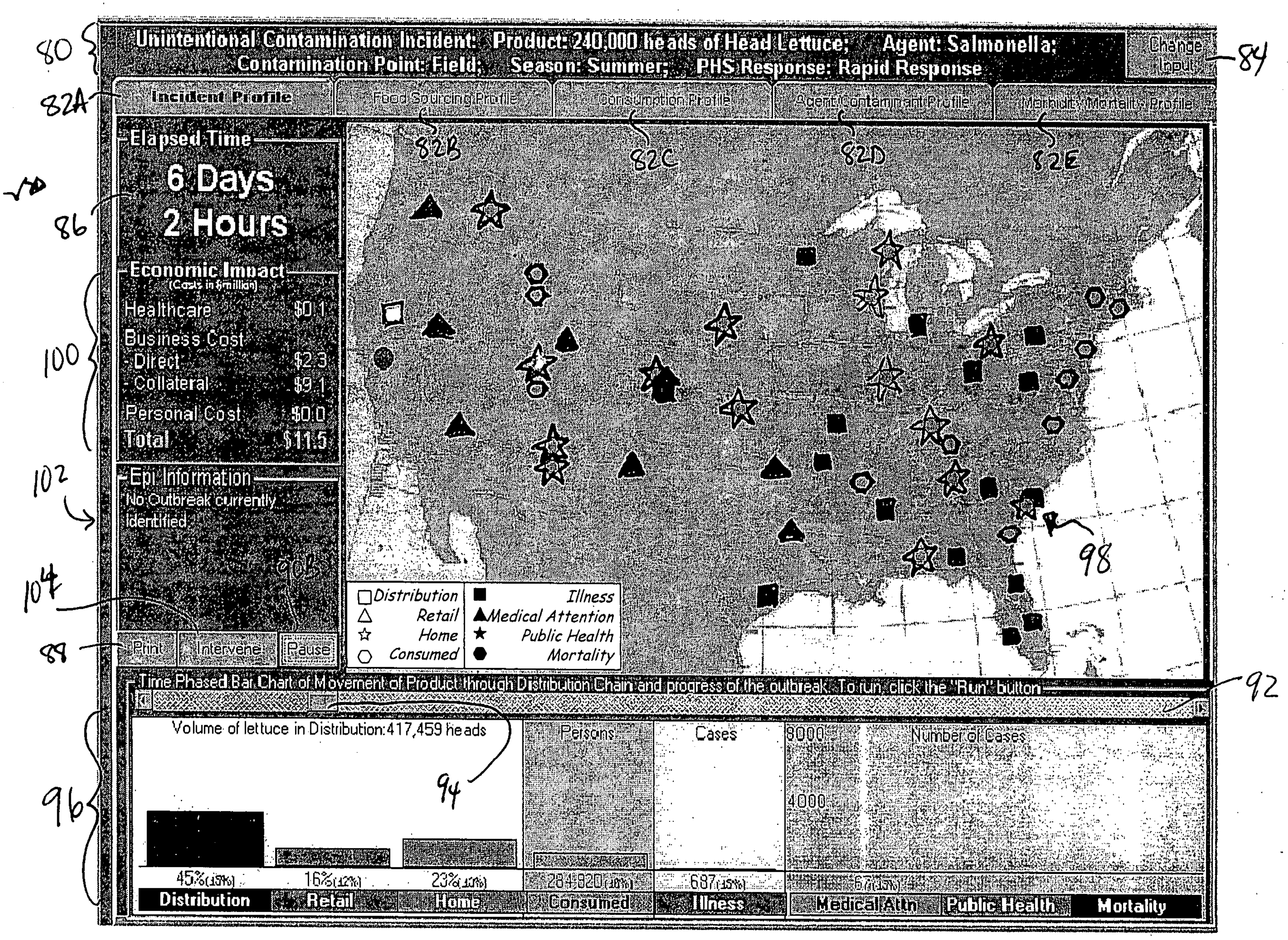
Epi Information
No Outbreak currently identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution:617,447 heads

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
● Mortality
Persons
Cases
Number of Cases
67% (17%)
13% (12%)
12% (12%)
123,723 (15%)
100 (15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
78
80
82A
82B
82C
82D
82E
84
86
88
92
94
96
98
100
102
104

FIG. 15



Unintentional Contamination Incident: **Product: 240,000 heads of Head Lettuce;** **Agent: Salmonella;**
Contamination Point: Field; **Season: Summer;** **PHS Response: Rapid Response**

Elapsed Time
6 Days
2 Hours

Economic Impact
(Costs in $million)

Healthcare	$0.1
Business Cost	
- Direct	$2.3
- Collateral	$9.1
Personal Cost	$0.0
Total	$11.5

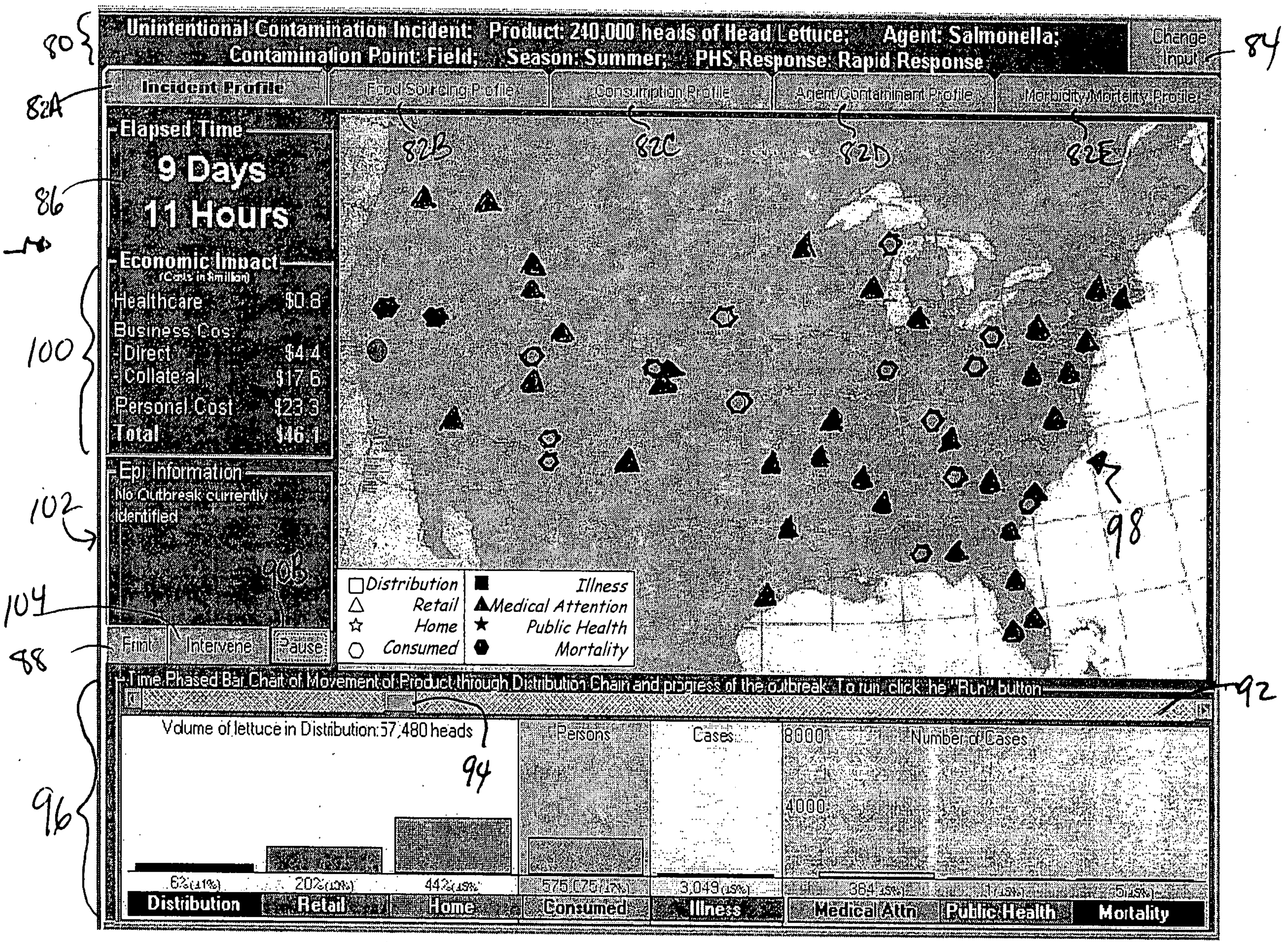
Epi Information
No Outbreak currently identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 417,459 heads

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
Distribution
Retail
Home
Consumed
Illness
Medical Attention
Public Health
Mortality
Persons
Cases
8000
4000
Number of Cases
45% (15%)
16% (12%)
23% (10%)
284,920 (10%)
687 (15%)
67 (15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
80
82A
84
82B
82C
82D
82E
78
86
100
102
104
88
98
92
94
96

FIG. 16



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time

9 Days
11 Hours

Economic Impact (Costs in $million)

Healthcare	$0.8
Business Cost:	
- Direct	$4.4
- Collateral	$17.6
Personal Cost	$23.3
Total	$46.1

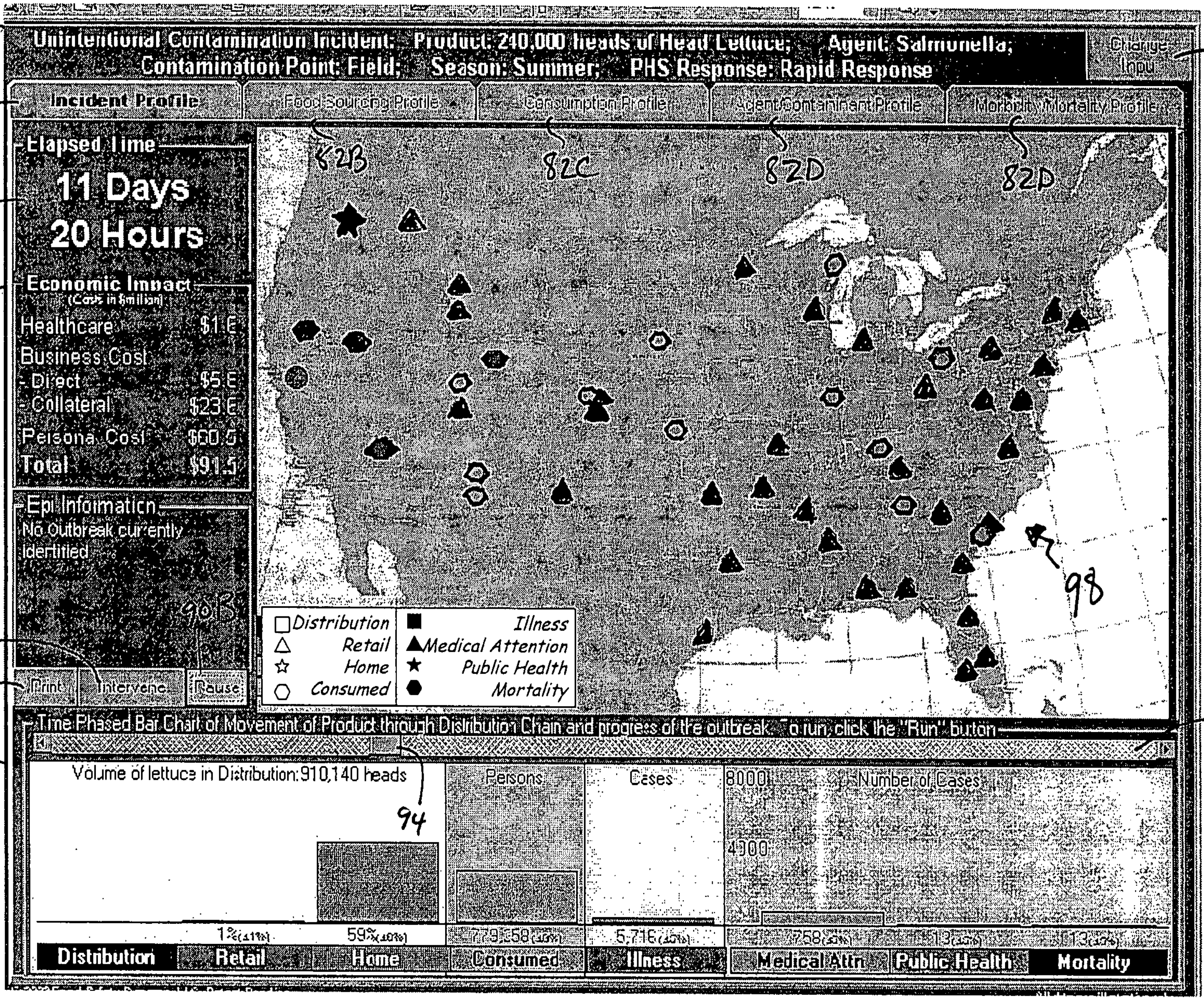
Epi Information
No Outbreak currently identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 57,480 heads

80
Change Input
84
Incident Profile
82A
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
82B
82C
82D
82E
86
78
100
102
90B
104
Print
Intervene
Pause
88
98
☐ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
92
94
96
Persons
Cases
8000
4000
Number of Cases
62 (.1%)
202 (.0%)
442 (.15%)
575 (75/.1%)
3,049 (.15%)
384 (.5%)
1 (.5%)
5 (.5%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

FIG. 17


Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
● Mortality
Persons
Cases
8000
4000
Number of Cases
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
78
80
82A
82B
82C
82D
82D
84
86
88
90B
92
94
96
98
100
102
104

Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
11 Days
20 Hours

Economic Impact
(Cost in $million)

Healthcare	$1.E
Business Cost	
- Direct	$5.E
- Collateral	$23.E
Persona Cost	$60.5
Total	$91.5

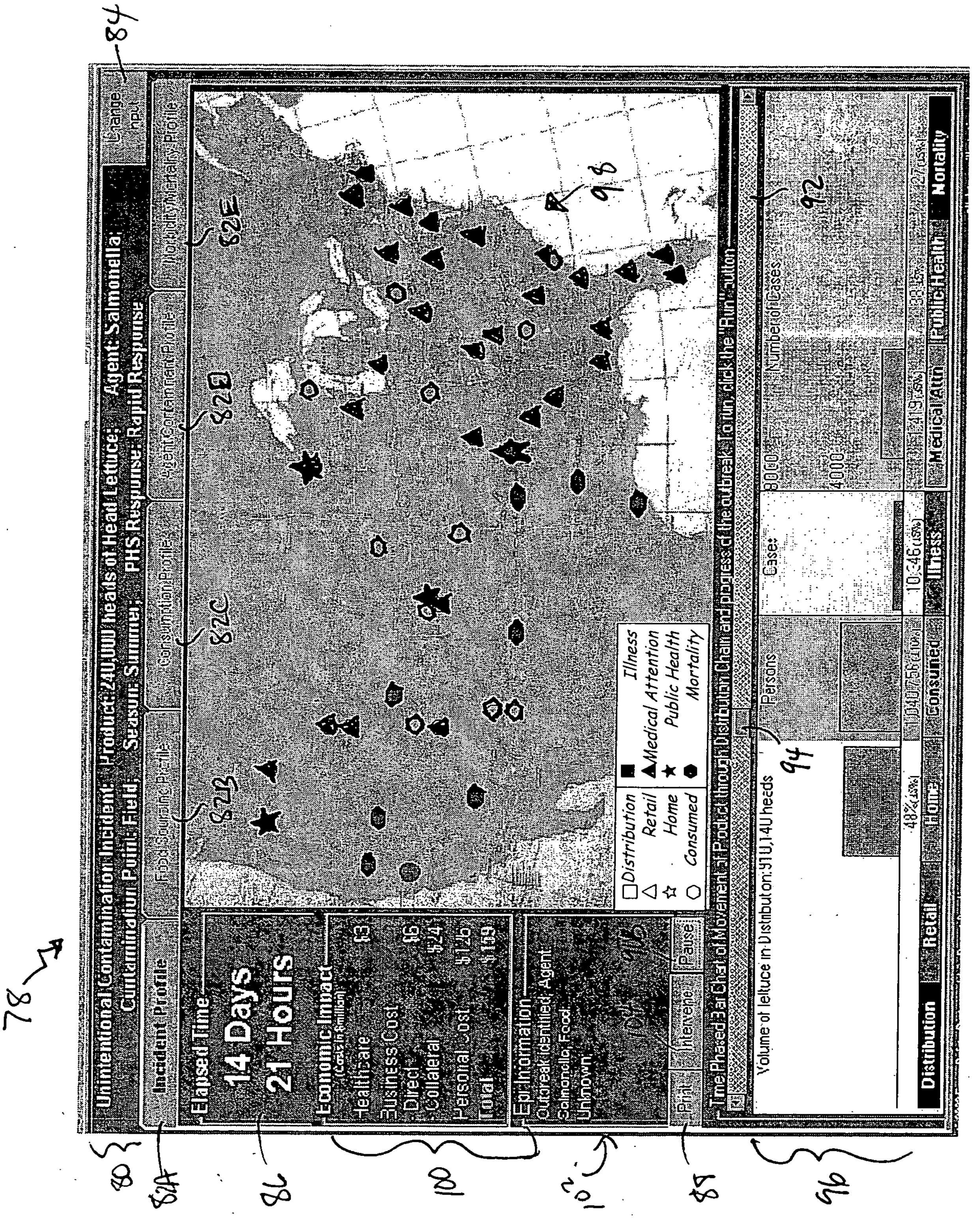
Epi Information
No Outbreak currently identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 910,140 heads

Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
1%	59%	779,358	5,716	758	13	13

FIG. 18



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
14 Days
21 Hours

Economic Impact (Costs in $million)

Healthcare	$3
Business Cost	$6
Direct	$24
Collateral	$126
Personal Cost	$159
Total	

Epi Information
Outbreak identified; Agent: Salmonella; Food: Unknown;

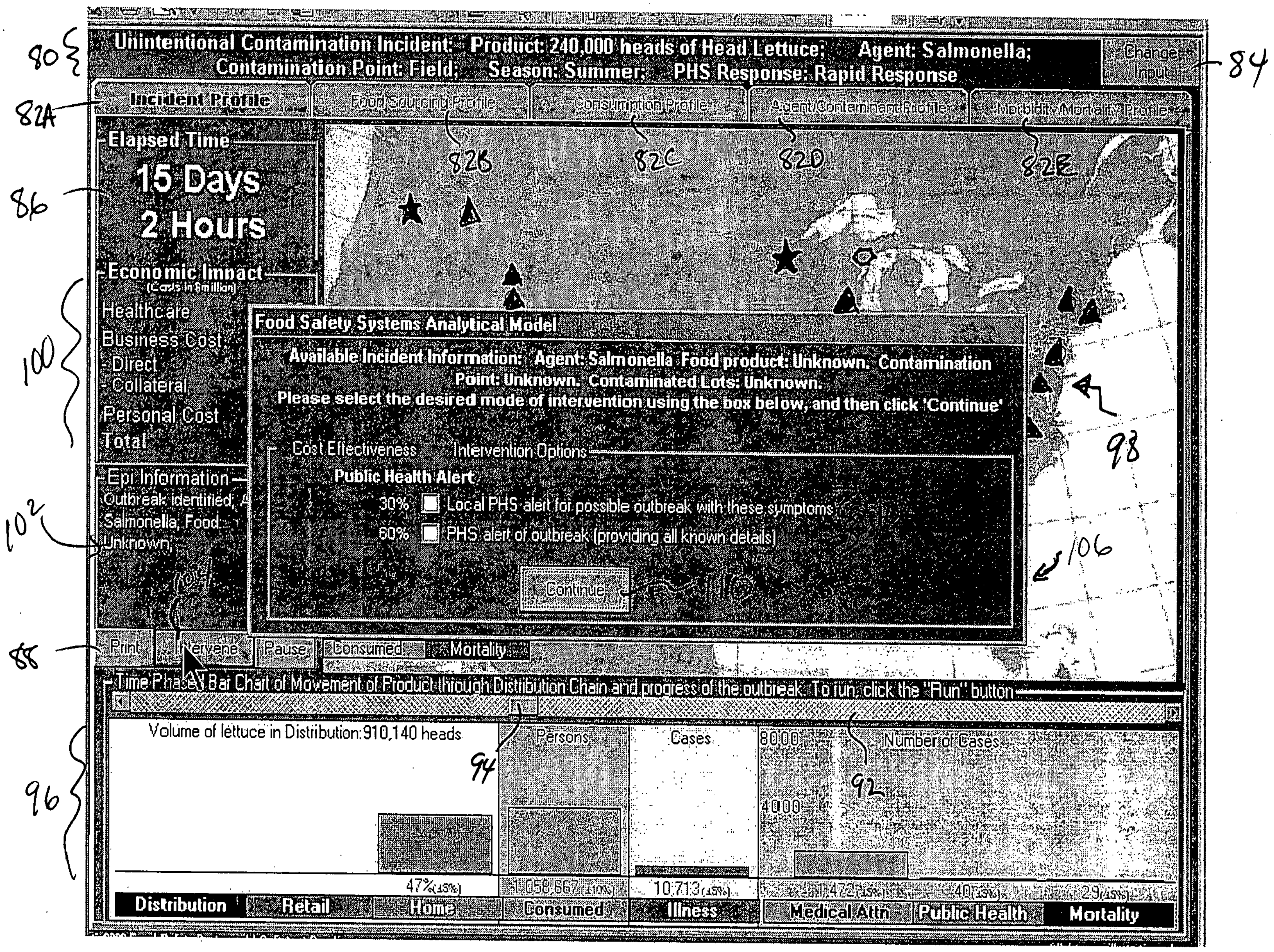
Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 910,140 heads

Distribution	Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
		48% (45%)	1040756 (10%)	10346 (15%)	1419 (15%)	38 (15%)	27 (15%)

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent Contaminant Profile
Morbidity/Mortality Profile
☐ Distribution ■ Illness
△ Retail ▲ Medical Attention
☆ Home ★ Public Health
○ Consumed ● Mortality
Print
Intervene
Pause
Persons
Cases
Number of Cases
8000
4000
78
80
82A
82B
82C
82D
82E
84
86
88
92
94
96
98
100
102

FIG. 19


Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time: 15 Days 2 Hours

Economic Impact (Costs in $million)
Healthcare
Business Cost
- Direct
- Collateral
Personal Cost
Total

Epi Information
Outbreak identified; A
Salmonella; Food:
Unknown;

Food Safety Systems Analytical Model

Available Incident Information: Agent: Salmonella. Food product: Unknown. Contamination Point: Unknown. Contaminated Lots: Unknown.
Please select the desired mode of intervention using the box below, and then click 'Continue'

Cost Effectiveness — Intervention Options

Public Health Alert
30% ☐ Local PHS alert for possible outbreak with these symptoms
60% ☐ PHS alert of outbreak (providing all known details)

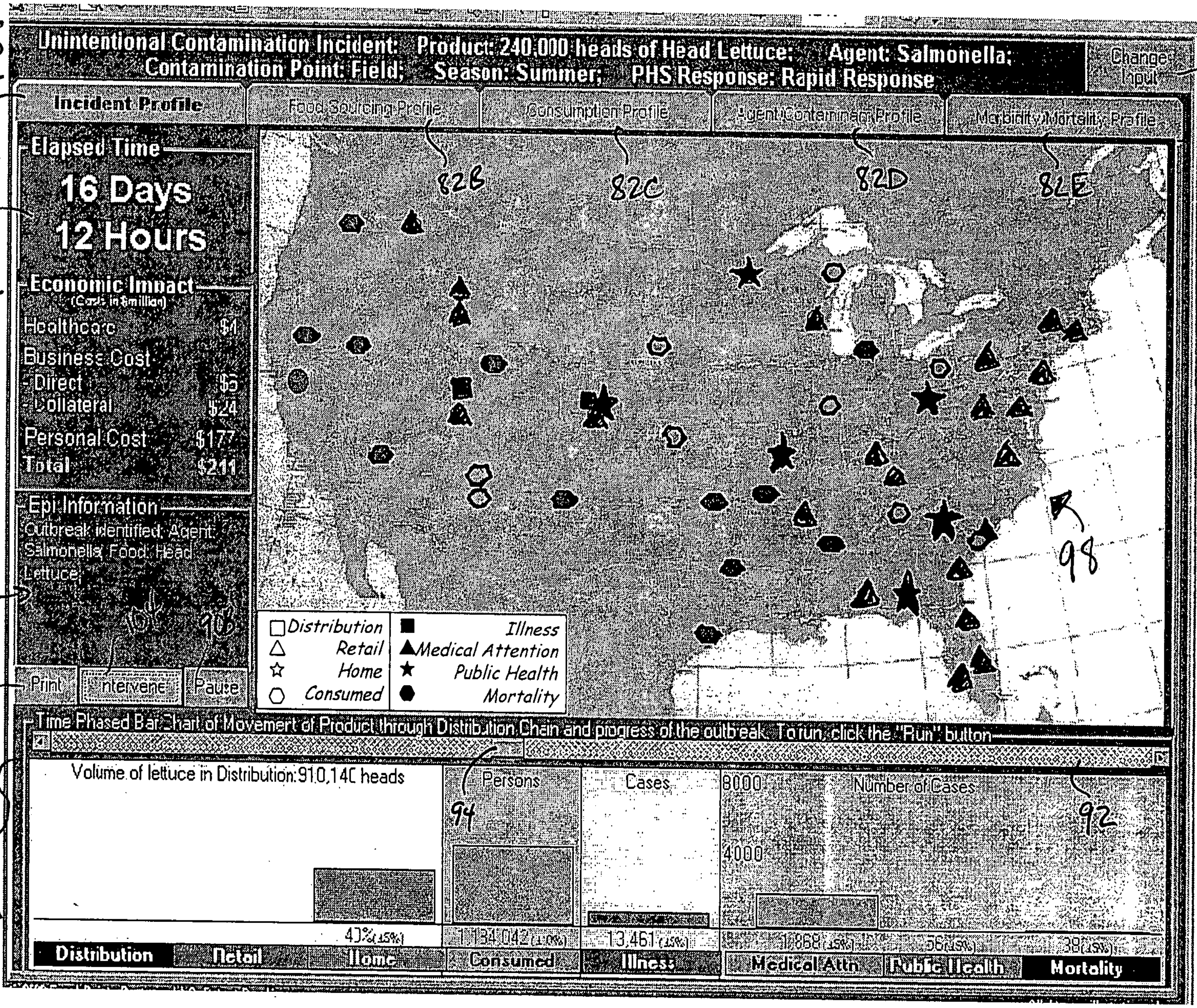
Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 910,140 heads

Distribution	Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
		47% (±5%)	1,058,667 (±10%)	10,713 (±5%)	1,472 (±5%)	40 (±5%)	29 (±5%)

80
84
Change Input
82A
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
82B
82C
82D
82E
86
100
102
98
106
Continue
88
Print
Intervene
Pause
Consumed
Mortality
96
94
92
Persons
Cases
8000
4000
Number of Cases

FIG. 20



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce: Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
16 Days
12 Hours

Economic Impact (Cost in $million)

Healthcare	$4
Business Cost	
-Direct	$5
-Collateral	$24
Personal Cost	$177
Total	$211

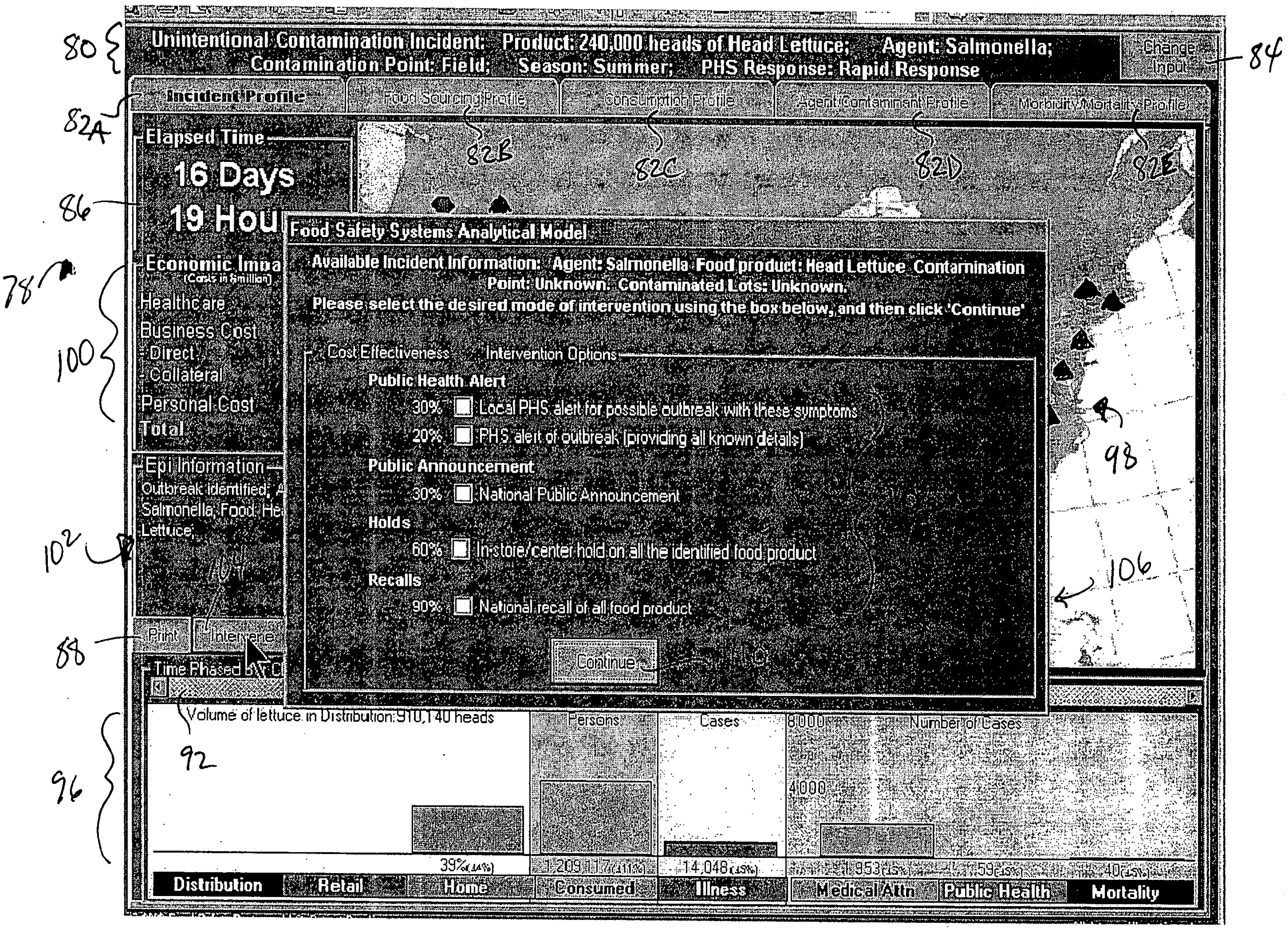
Epi Information
Outbreak identified: Agent: Salmonella; Food: Head Lettuce;

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

Volume of lettuce in Distribution: 910,140 heads

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent Contaminant Profile
Morbidity Mortality Profile
☐ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
● Mortality
Print
Intervene
Pause
Persons
Cases
8000
4000
Number of Cases
43% (45%)
134,042 (10%)
13,461 (45%)
1,868 (45%)
56 (45%)
38 (45%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
80
82A
82B
82C
82D
82E
84
78
100
102
88
96
94
92
98

FIG. 21



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
16 Days
19 Hou

Economic Impa
(Costs in $million)
Healthcare
Business Cost
- Direct
- Collateral
Personal Cost
Total

Epi Information
Outbreak identified; A
Salmonella; Food He
Lettuce;

Food Safety Systems Analytical Model

Available Incident Information: Agent: Salmonella Food product: Head Lettuce Contamination Point: Unknown. Contaminated Lots: Unknown.

Please select the desired mode of intervention using the box below, and then click 'Continue'

Cost Effectiveness / Intervention Options

Public Health Alert
- 30% ☐ Local PHS alert for possible outbreak with these symptoms
- 20% ☐ PHS alert of outbreak (providing all known details)

Public Announcement
- 30% ☐ National Public Announcement

Holds
- 60% ☐ In-store/center hold on all the identified food product

Recalls
- 90% ☐ National recall of all food product

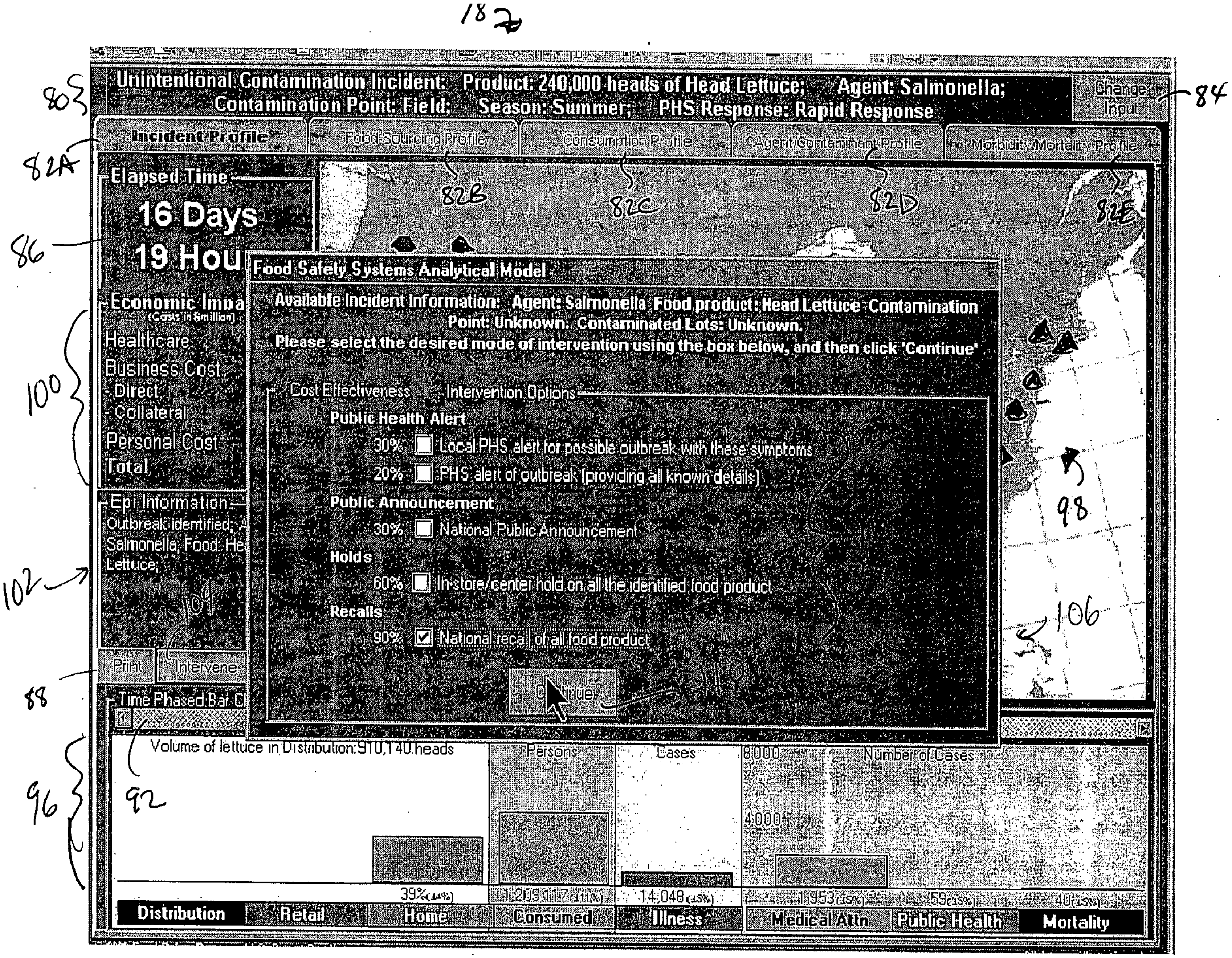
Time Phased by C

Volume of lettuce in Distribution: 910,140 heads

Distribution	Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
		39%(44%)	1,209,117(11%)	14,048(15%)	1,953(15%)	159(15%)	40(15%)

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Continue
Persons
Cases
8000
4000
Number of Cases
80
84
82A
82B
82C
82D
82E
86
78
100
98
102
104
106
88
92
96

FIG. 22



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Food Safety Systems Analytical Model

Available Incident Information: Agent: Salmonella Food product: Head Lettuce Contamination Point: Unknown. Contaminated Lots: Unknown.

Please select the desired mode of intervention using the box below, and then click 'Continue'

Cost Effectiveness | Intervention Options

Public Health Alert

- 30% ☐ Local PHS alert for possible outbreak with these symptoms
- 20% ☐ PHS alert of outbreak (providing all known details)

Public Announcement

- 30% ☐ National Public Announcement

Holds

- 60% ☐ In-store/center hold on all the identified food product

Recalls

- 90% ☑ National recall of all food product

Elapsed Time: 16 Days 19 Hou

Economic Impa (Costs in $million)

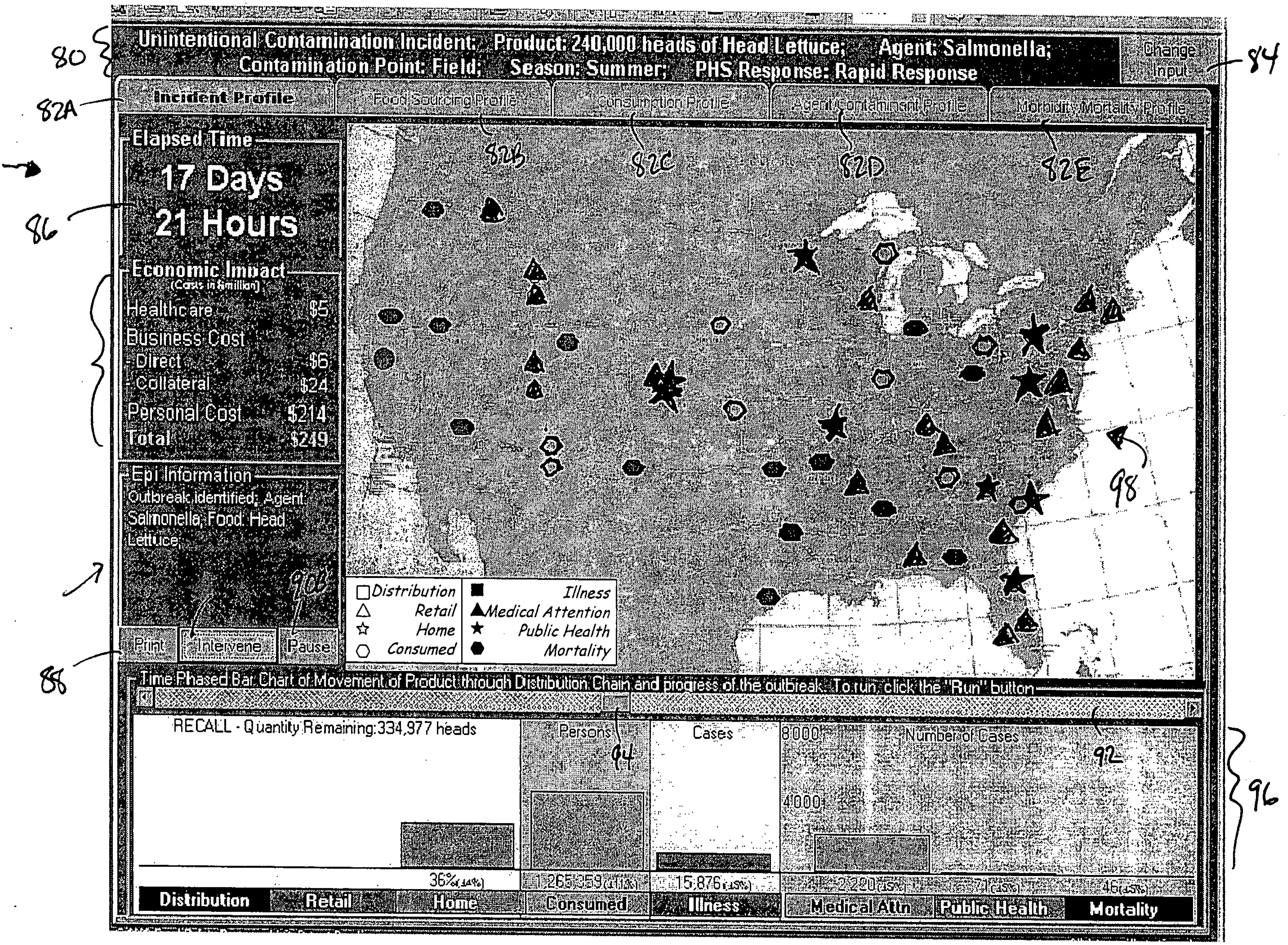
- Healthcare
- Business Cost
- Direct
- Collateral
- Personal Cost
- Total

Epi Information: Outbreak identified; A Salmonella; Food: He Lettuce;

Volume of lettuce in Distribution: 910,140 heads

18z
80
84
Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
82A
82B
82C
82D
82E
86
100
102
104
88
96
92
98
106
Print
Intervene
Time Phased Bar C
Continue
Persons
Cases
Number of Cases
8000
4000
39% (44%)
1,203,117 (41%)
14,048 (45%)
1,953 (45%)
59 (45%)
40 (45%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

FIG. 23



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
17 Days
21 Hours

Economic Impact
(Costs in $million)
Healthcare $5
Business Cost
- Direct $6
- Collateral $24
Personal Cost $214
Total $249

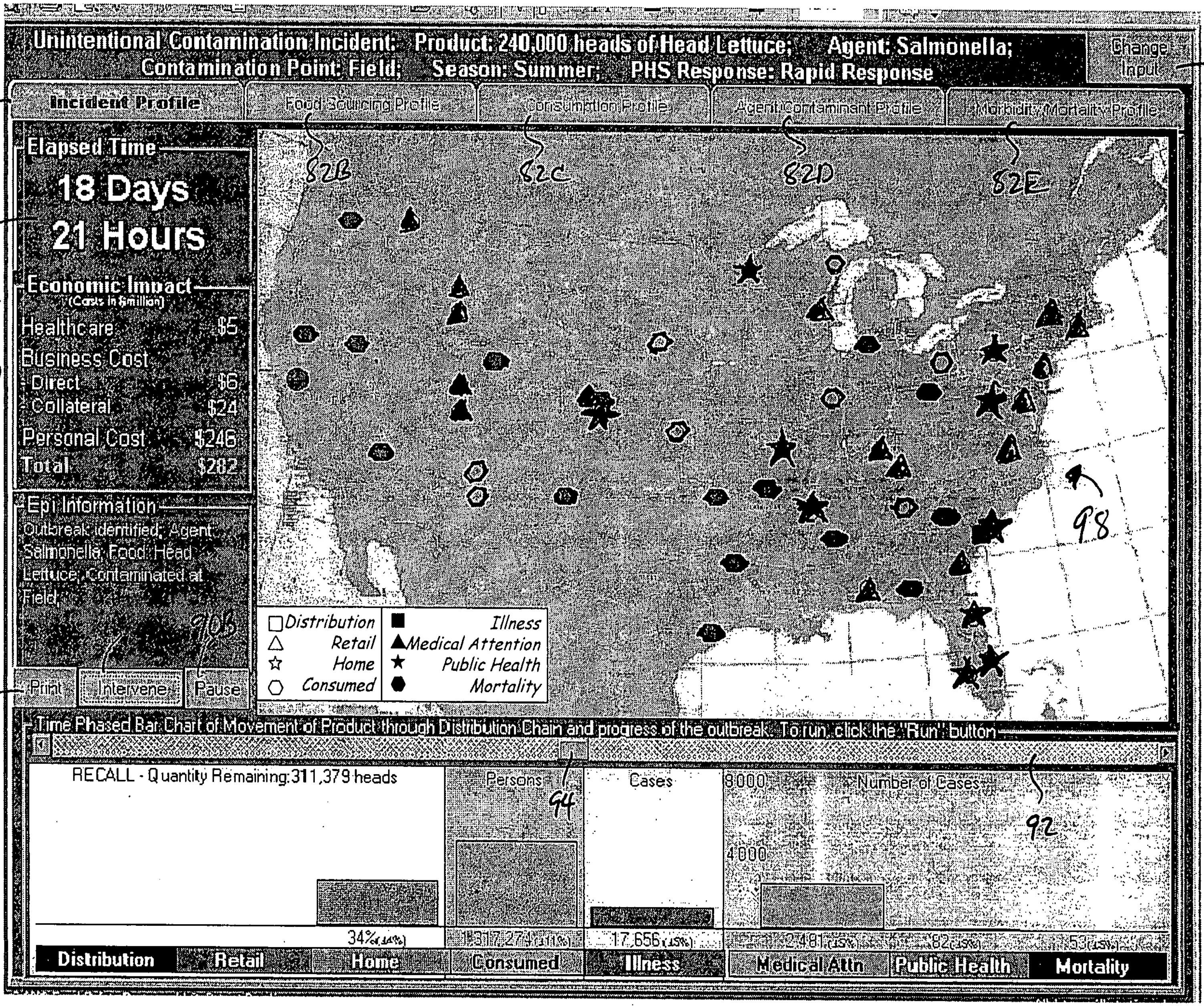
Epi Information
Outbreak identified; Agent: Salmonella; Food: Head Lettuce;

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

RECALL - Quantity Remaining: 334,977 heads

80
Change Input
84
Incident Profile
82A
Food Sourcing Profile
82B
Consumption Profile
82C
Agent/Contaminant Profile
82D
Morbidity/Mortality Profile
82E
78
86
88
90B
Print
Intervene
Pause
98
☐ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
Persons
94
Cases
8000
4000
Number of Cases
92
96
36%(14%)
1,265,359(±1%)
15,876(±5%)
2,220(±5%)
71(±5%)
46(±5%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

FIG. 24



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
18 Days
21 Hours

Economic Impact (Costs in $million)

Healthcare	$5
Business Cost	
Direct	$6
Collateral	$24
Personal Cost	$246
Total	$282

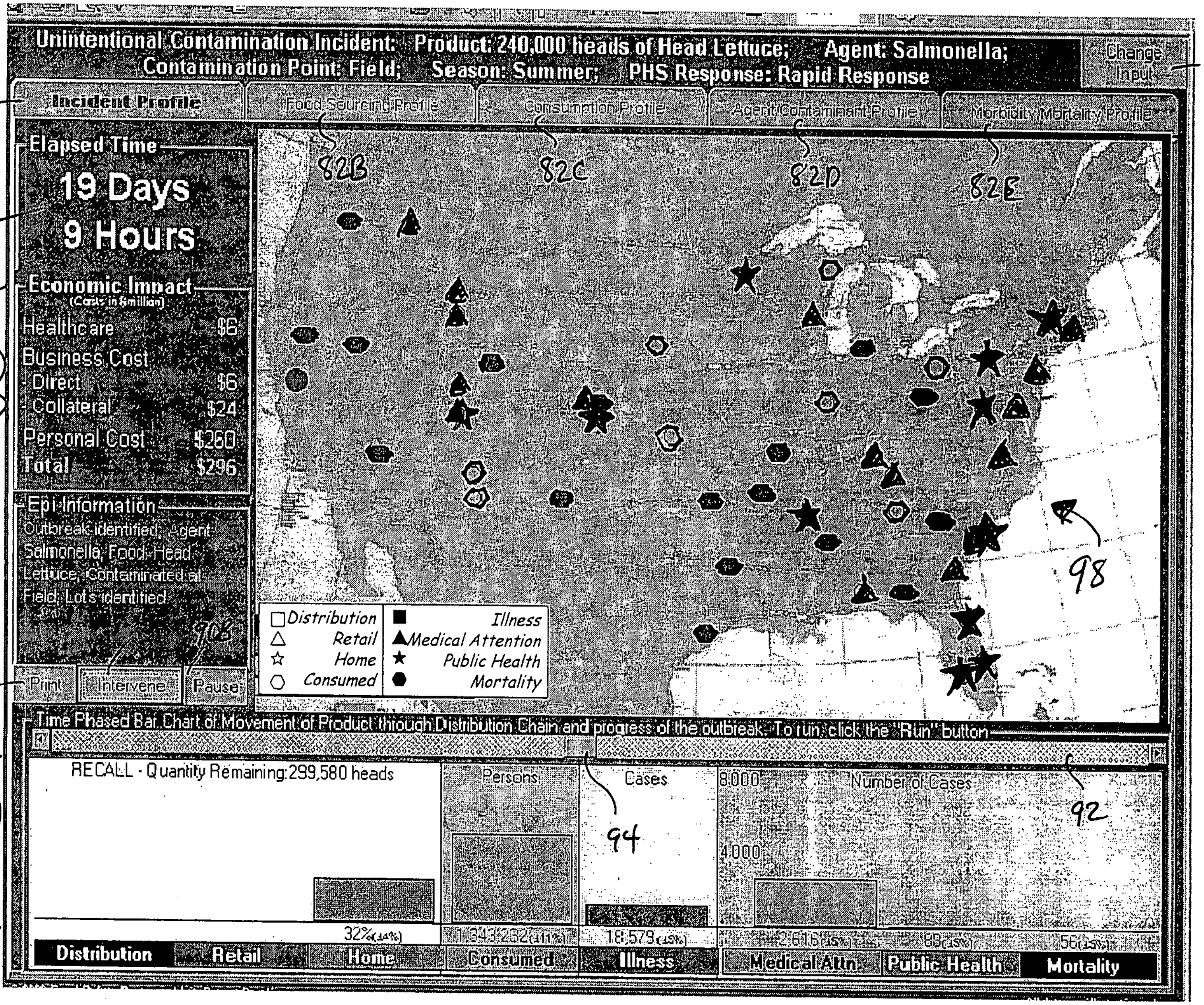
Epi Information
Outbreak identified; Agent: Salmonella; Food: Head Lettuce; Contaminated at Field;

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

RECALL - Quantity Remaining: 311,379 heads

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
□ Distribution
△ Retail
☆ Home
○ Consumed
■ Illness
▲ Medical Attention
★ Public Health
● Mortality
Persons
Cases
8000
4000
Number of Cases
34% (14%)
317,274 (11%)
17,656 (15%)
2,481 (15%)
82 (15%)
53 (15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
80
82A
78
84
86
88
90
82B
82C
82D
82E
84
98
92
94
96

FIG. 25



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
19 Days
9 Hours

Economic Impact
(Costs in $million)

Healthcare	$6
Business Cost	
Direct	$6
Collateral	$24
Personal Cost	$260
Total	$296

Epi Information
Outbreak identified: Agent Salmonella; Food: Head Lettuce; Contaminated at Field; Lots identified

□	Distribution	■	Illness
△	Retail	▲	Medical Attention
☆	Home	★	Public Health
⬡	Consumed	⬢	Mortality

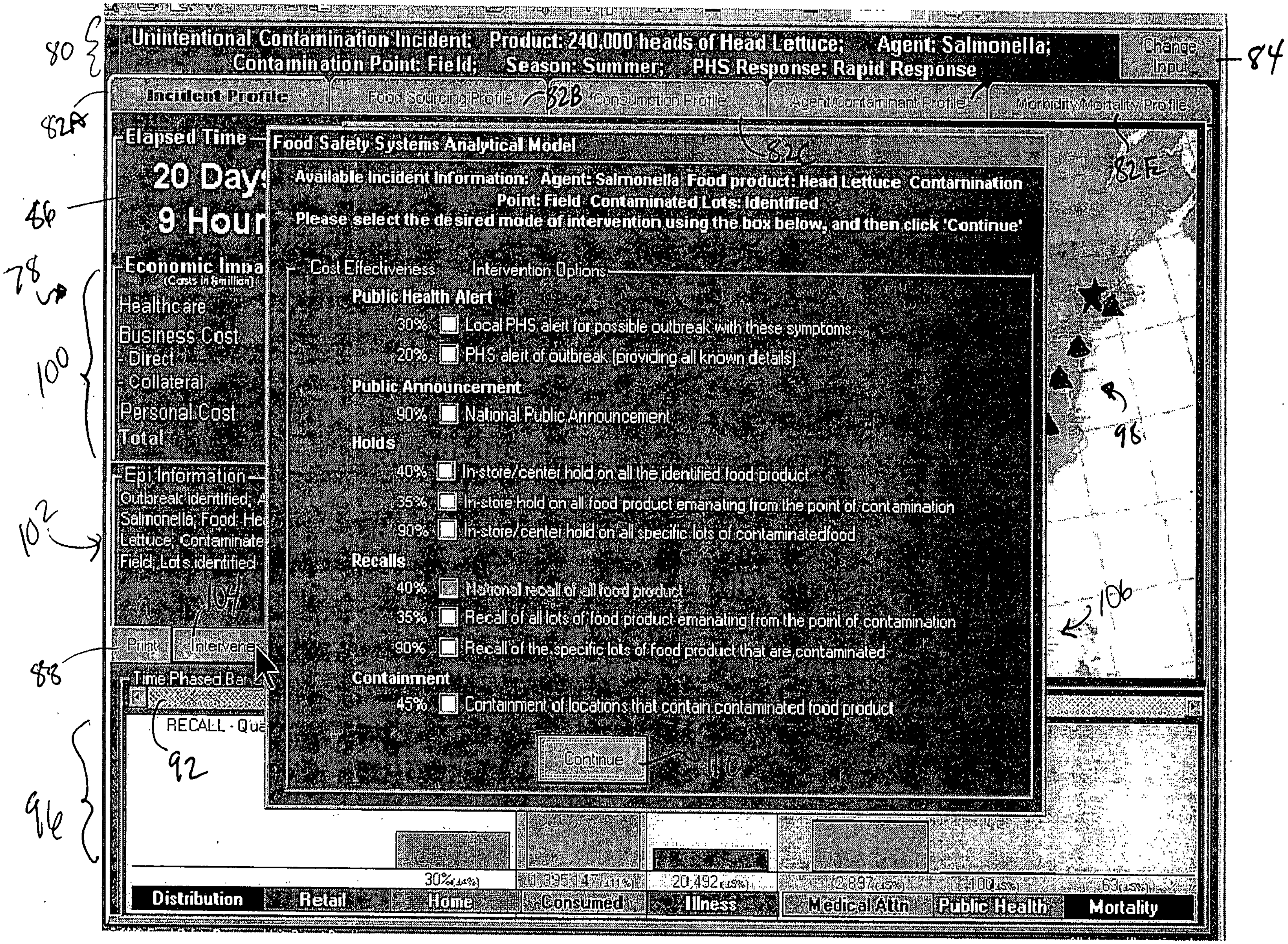
Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

RECALL - Quantity Remaining: 299,580 heads

Distribution	Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
		32% (44%)	1,343,232 (11%)	18,579 (15%)	2,616 (15%)	83 (15%)	56 (15%)

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
Persons
Cases
8000
4000
Number of Cases
80
82A
78
86
88
90
82B
82C
82D
82E
84
98
94
92
96

FIG. 25



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Food Safety Systems Analytical Model

Available Incident Information: Agent: Salmonella Food product: Head Lettuce Contamination Point: Field Contaminated Lots: Identified

Please select the desired mode of intervention using the box below, and then click 'Continue'

Public Health Alert

- 30% ☐ Local PHS alert for possible outbreak with these symptoms
- 20% ☐ PHS alert of outbreak (providing all known details)

Public Announcement

- 90% ☐ National Public Announcement

Holds

- 40% ☐ In-store/center hold on all the identified food product
- 35% ☐ In-store hold on all food product emanating from the point of contamination
- 90% ☐ In-store/center hold on all specific lots of contaminatedfood

Recalls

- 40% ☑ National recall of all food product
- 35% ☐ Recall of all lots of food product emanating from the point of contamination
- 90% ☐ Recall of the specific lots of food product that are contaminated

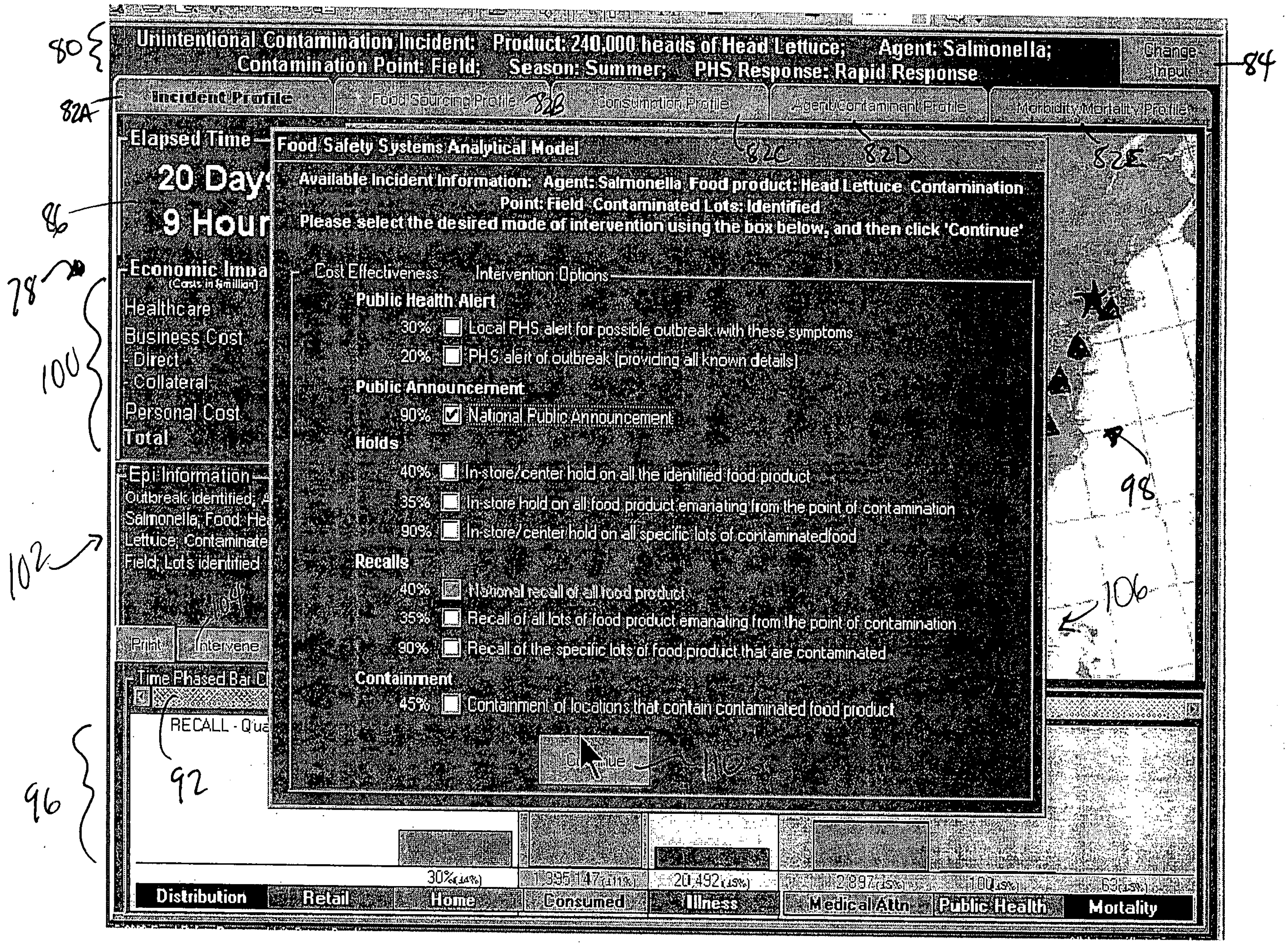
Containment

- 45% ☐ Containment of locations that contain contaminated food product

Epi Information
Outbreak identified; A
Salmonella; Food: He
Lettuce; Contaminate
Field; Lots identified

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Elapsed Time
20 Days
9 Hour
Economic Impa
(Costs in $million)
Healthcare
Business Cost
- Direct
- Collateral
Personal Cost
Total
Cost Effectiveness
Intervention Options
Continue
Print
Intervene
Time Phased Bar
RECALL - Qua
30%(15%)
1,395,147(11%)
20,492(15%)
2,897(15%)
100(15%)
63(15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
80
84
82A
82B
82C
82E
86
78
100
102
104
88
92
94
96
106
110

FIG. 26


80
84
82A
82B
82C
82D
82E
86
78
100
102
96
92
98
106
110
Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity Mortality Profile
Elapsed Time
20 Days
9 Hour
Economic Impa
(Costs in $million)
Healthcare
Business Cost
-Direct
-Collateral
Personal Cost
Total
Epi Information
Print
Intervene
Time Phased Bar Ch
RECALL - Qua
Continue
30% (14%)
1,395,147 (11%)
20,492 (15%)
2,897 (15%)
100 (15%)
63 (15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality

Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Outbreak identified; A
Salmonella; Food: He
Lettuce; Contaminate
Field; Lots identified

Food Safety Systems Analytical Model

Available Incident Information: Agent: Salmonella Food product: Head Lettuce Contamination Point: Field Contaminated Lots: Identified

Please select the desired mode of intervention using the box below, and then click 'Continue'

Cost Effectiveness Intervention Options

Public Health Alert

30% ☐ Local PHS alert for possible outbreak with these symptoms
20% ☐ PHS alert of outbreak (providing all known details)

Public Announcement

90% ☑ National Public Announcement

Holds

40% ☐ In-store/center hold on all the identified food product
35% ☐ In-store hold on all food product emanating from the point of contamination
90% ☐ In-store/center hold on all specific lots of contaminatedfood

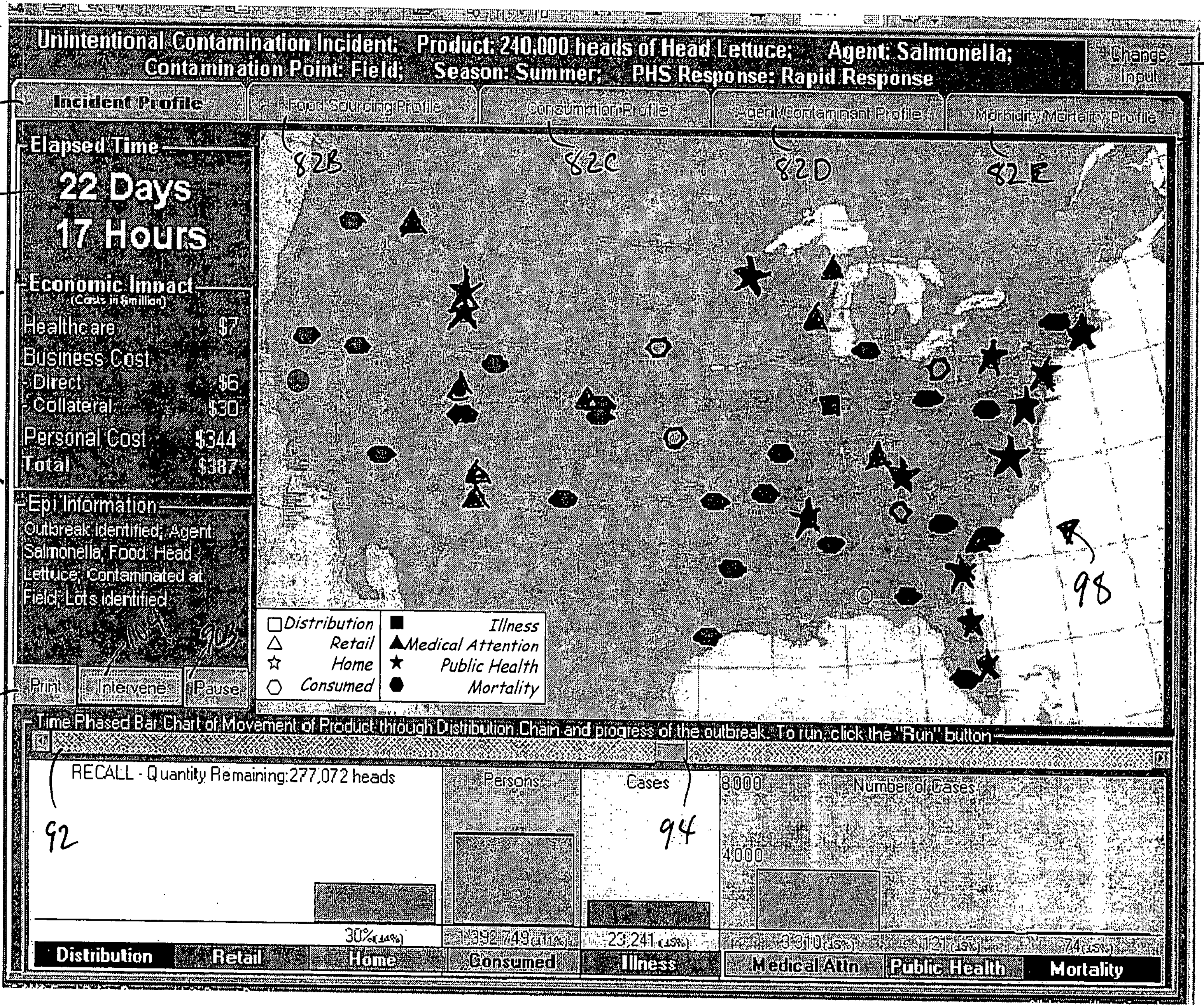
Recalls

40% ☐ National recall of all food product
35% ☐ Recall of all lots of food product emanating from the point of contamination
90% ☐ Recall of the specific lots of food product that are contaminated

Containment

45% ☐ Containment of locations that contain contaminated food product

FIG. 27



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time
22 Days
17 Hours

Economic Impact
(Costs in $million)

Healthcare	$7
Business Cost	
- Direct	$6
- Collateral	$30
Personal Cost	$344
Total	$387

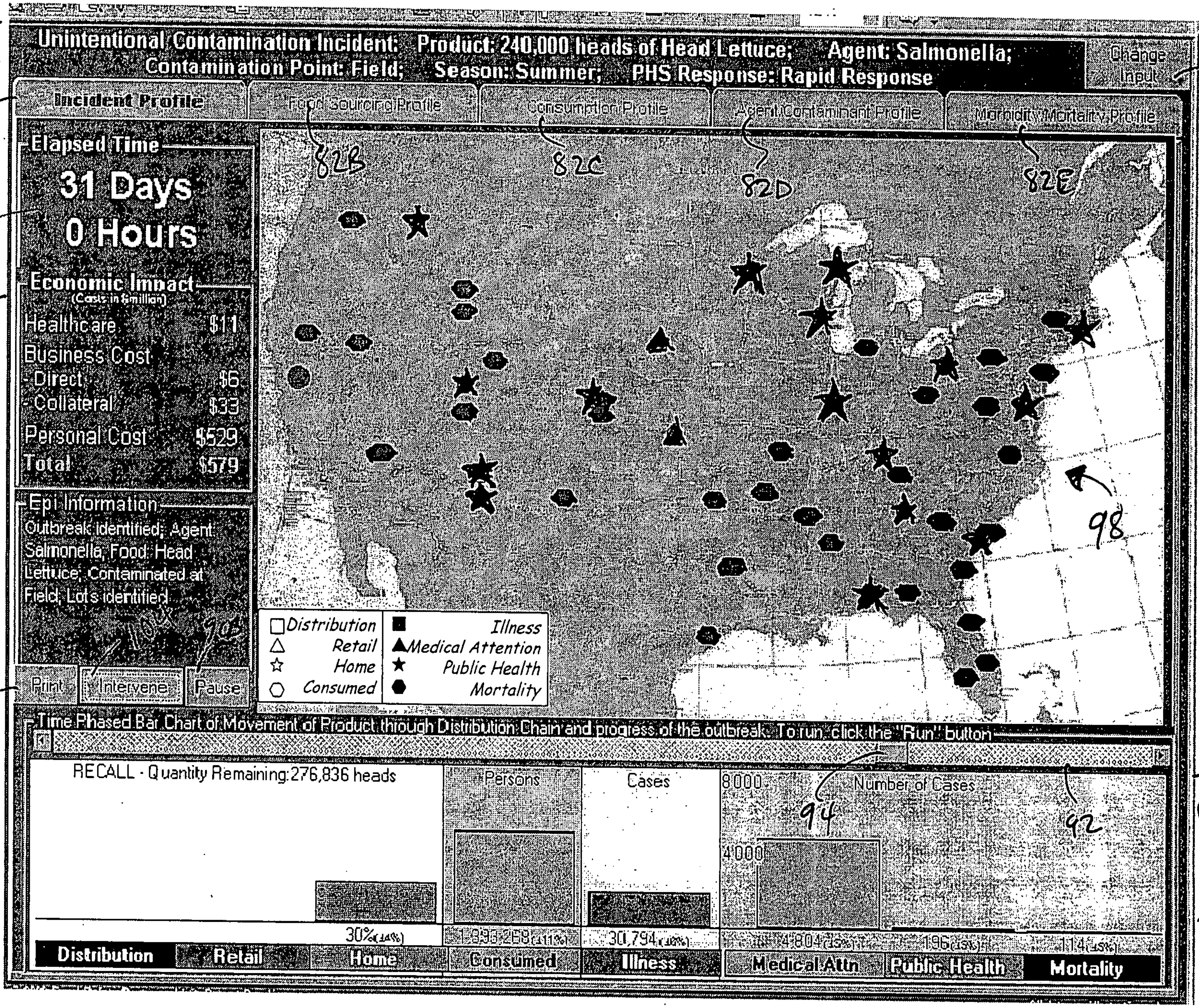
Epi Information
Outbreak identified; Agent: Salmonella; Food: Head Lettuce; Contaminated at Field; Lots identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

RECALL - Quantity Remaining: 277,072 heads

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
□ Distribution
△ Retail
☆ Home
⬡ Consumed
■ Illness
▲ Medical Attention
★ Public Health
⬢ Mortality
Print
Intervene
Pause
Persons
Cases
8000
4000
Number of Cases
30% (14%)
1,392,749 (11%)
23,241 (15%)
3,310 (15%)
121 (15%)
74 (15%)
Distribution
Retail
Home
Consumed
Illness
Medical Attn
Public Health
Mortality
80
84
82A
82B
82C
82D
82E
86
100
102
104
90
88
92
94
96
98

FIG. 28


80
84
82A
82B
82C
82D
82E
86
100
102
88
98
94
92
96
Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Print
Intervene
Pause
Distribution
Retail
Home
Consumed
Illness
Medical Attention
Public Health
Mortality
Persons
Cases
Number of Cases
8000
4000
Medical Attn

Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Elapsed Time

31 Days
0 Hours

Economic Impact
(Costs in $million)

Healthcare	$11
Business Cost	
- Direct	$6
- Collateral	$33
Personal Cost	$529
Total	$579

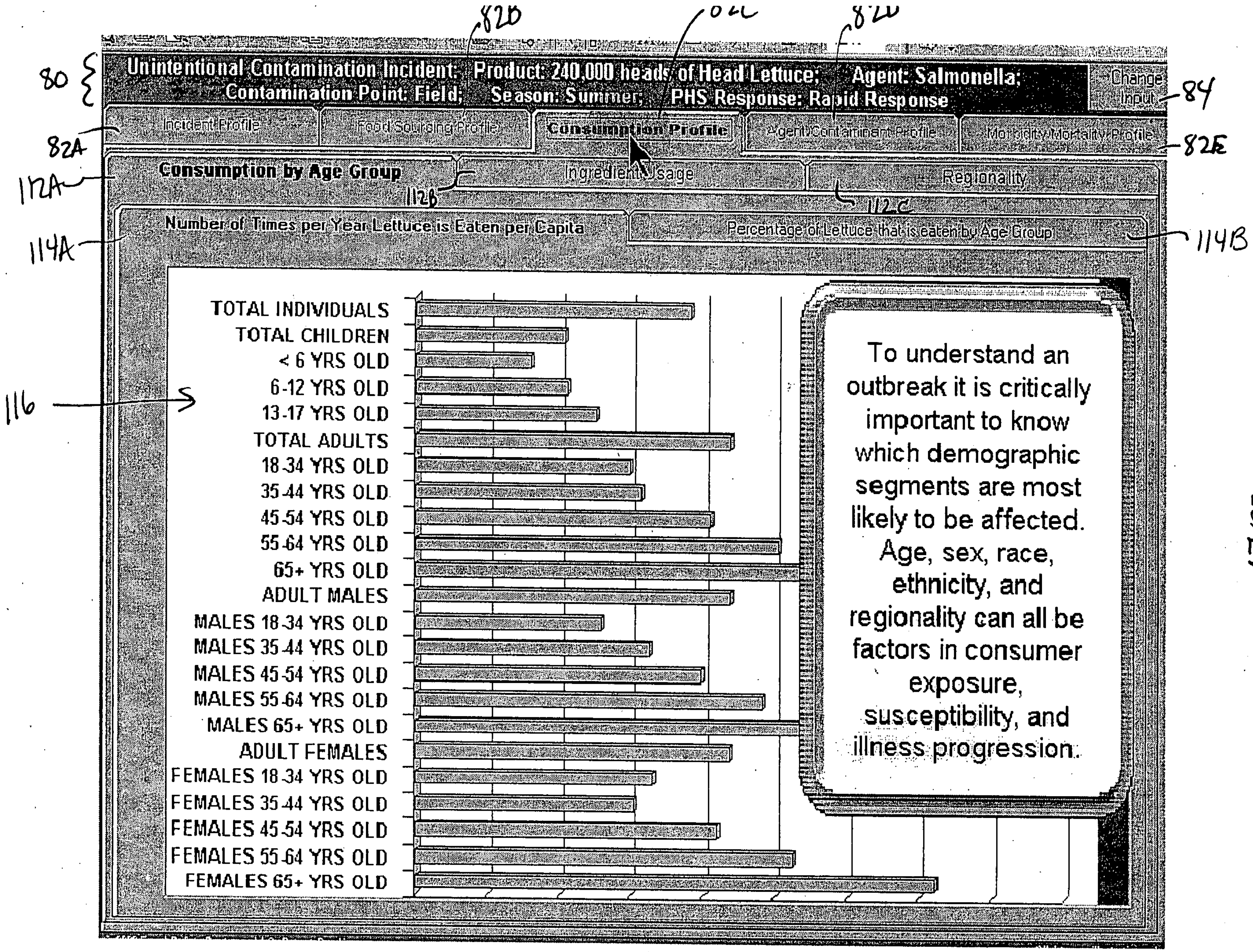
Epi Information
Outbreak identified; Agent Salmonella; Food: Head Lettuce; Contaminated at Field; Lots identified

Time Phased Bar Chart of Movement of Product through Distribution Chain and progress of the outbreak. To run, click the "Run" button

RECALL - Quantity Remaining: 276,836 heads

Distribution	Retail	Home	Consumed	Illness	Medical Attn	Public Health	Mortality
		30% (14%)	1,995,268 (11%)	30,794 (10%)	4,804 (15%)	196 (15%)	114 (15%)

FIG. 29

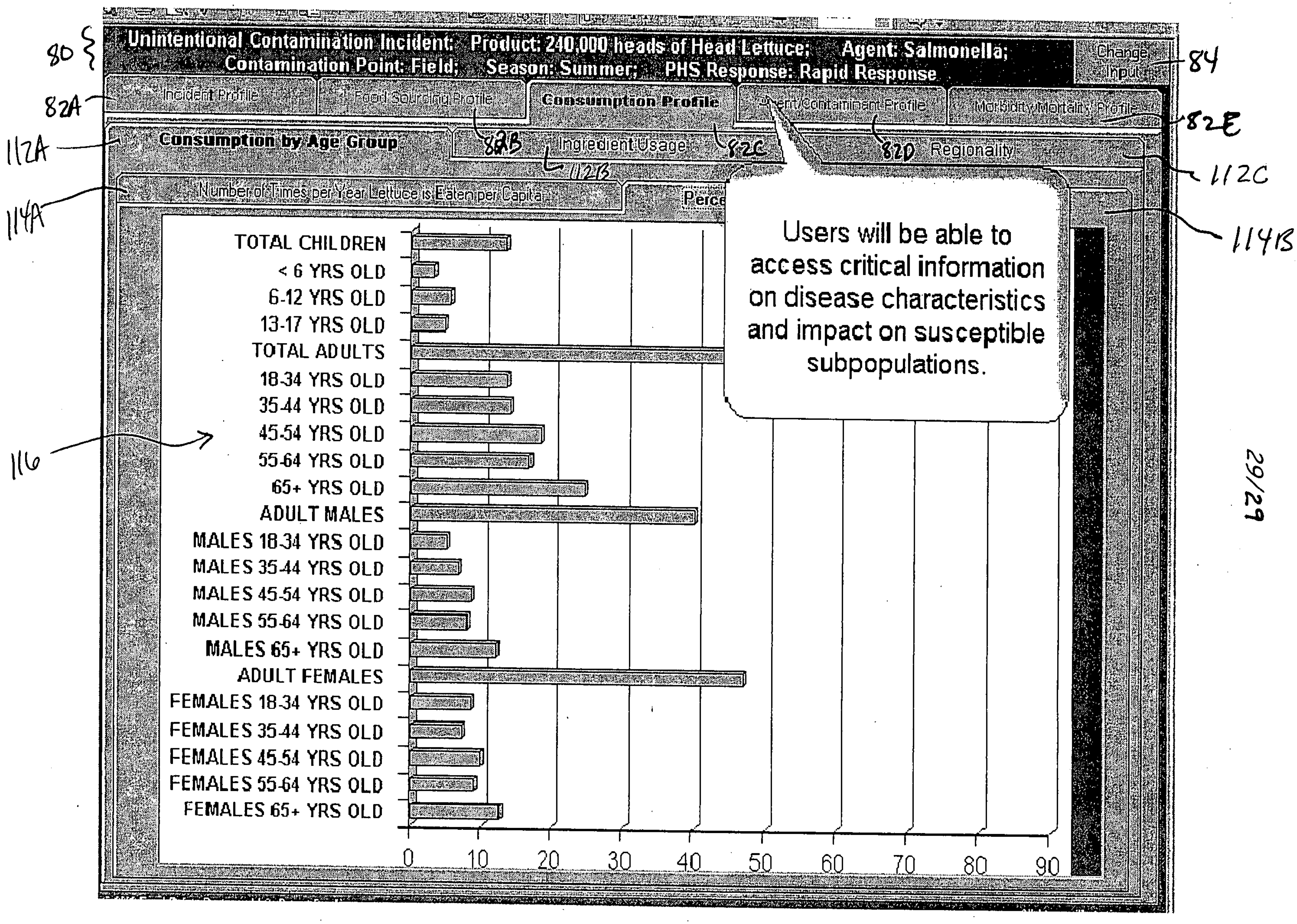


Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella;
Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

To understand an outbreak it is critically important to know which demographic segments are most likely to be affected. Age, sex, race, ethnicity, and regionality can all be factors in consumer exposure, susceptibility, and illness progression.

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Consumption by Age Group
Ingredient Usage
Regionality
Number of Times per Year Lettuce is Eaten per Capita
Percentage of Lettuce that is eaten by Age Group
TOTAL INDIVIDUALS
TOTAL CHILDREN
< 6 YRS OLD
6-12 YRS OLD
13-17 YRS OLD
TOTAL ADULTS
18-34 YRS OLD
35-44 YRS OLD
45-54 YRS OLD
55-64 YRS OLD
65+ YRS OLD
ADULT MALES
MALES 18-34 YRS OLD
MALES 35-44 YRS OLD
MALES 45-54 YRS OLD
MALES 55-64 YRS OLD
MALES 65+ YRS OLD
ADULT FEMALES
FEMALES 18-34 YRS OLD
FEMALES 35-44 YRS OLD
FEMALES 45-54 YRS OLD
FEMALES 55-64 YRS OLD
FEMALES 65+ YRS OLD
80
82A
82B
82C
82D
82E
84
112A
112B
112C
114A
114B
116

FIG. 30



Unintentional Contamination Incident: Product: 240,000 heads of Head Lettuce; Agent: Salmonella; Contamination Point: Field; Season: Summer; PHS Response: Rapid Response

Users will be able to access critical information on disease characteristics and impact on susceptible subpopulations.

Change Input
Incident Profile
Food Sourcing Profile
Consumption Profile
Agent/Contaminant Profile
Morbidity/Mortality Profile
Consumption by Age Group
Ingredient Usage
Regionality
Number of Times per Year Lettuce is Eaten per Capita
Perce
TOTAL CHILDREN
< 6 YRS OLD
6-12 YRS OLD
13-17 YRS OLD
TOTAL ADULTS
18-34 YRS OLD
35-44 YRS OLD
45-54 YRS OLD
55-64 YRS OLD
65+ YRS OLD
ADULT MALES
MALES 18-34 YRS OLD
MALES 35-44 YRS OLD
MALES 45-54 YRS OLD
MALES 55-64 YRS OLD
MALES 65+ YRS OLD
ADULT FEMALES
FEMALES 18-34 YRS OLD
FEMALES 35-44 YRS OLD
FEMALES 45-54 YRS OLD
FEMALES 55-64 YRS OLD
FEMALES 65+ YRS OLD
0
10
20
30
40
50
60
70
80
90
80
82A
82B
82C
82D
82E
84
112A
112B
112C
114A
114B
116

FIG. 31